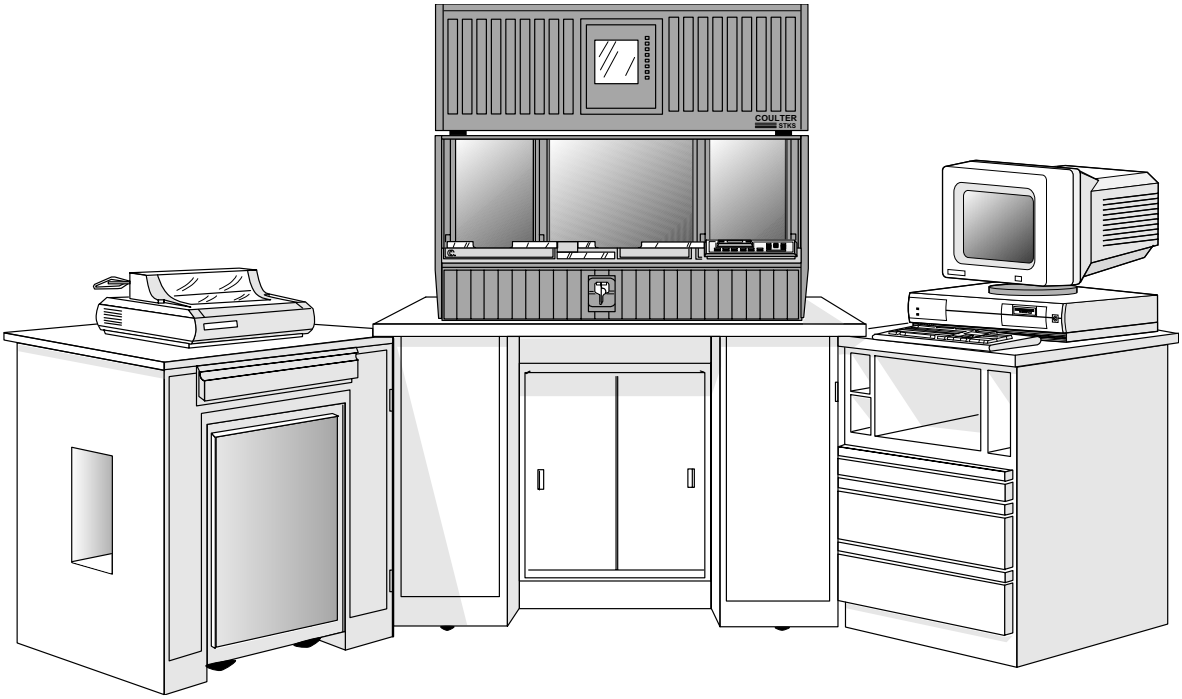
# COULTER® STKS Analyzer with Reticulocyte Analysis

## Operator's Guide




PN 4237188B (March 1995)

COULTER CORPORATION
Miami, Florida 33196

READ ALL PRODUCT MANUALS AND CONSULT WITH COULTER-TRAINED PERSONNEL BEFORE ATTEMPTING TO OPERATE INSTRUMENT

## HAZARDS AND OPERATIONAL PRECAUTIONS AND LIMITATIONS

WARNINGS, CAUTIONS, and IMPORTANTS alert you as follows:

**WARNING** - Might cause injury.
**CAUTION** - Might cause damage to the instrument.
**IMPORTANT** - Might cause misleading results.

**CAUTION**

**System integrity might be compromised and operational errors might occur if:**

- **This equipment is used in a manner other than specified. Operate the instrument as instructed in the Product Manuals.**
- **You introduced software that is not authorized by Coulter into your computer. Only operate your system's computer with software authorized by Coulter.**

Coulter Corporation urges its customers to comply with all national health and safety standards such as the use of barrier protection. This may include, but it is not limited to, protective eye wear, gloves, and suitable laboratory attire when operating or maintaining this or any other automated laboratory analyzer.

In the USA, for Service call Coulter Customer Operations 1-800-526-7694.

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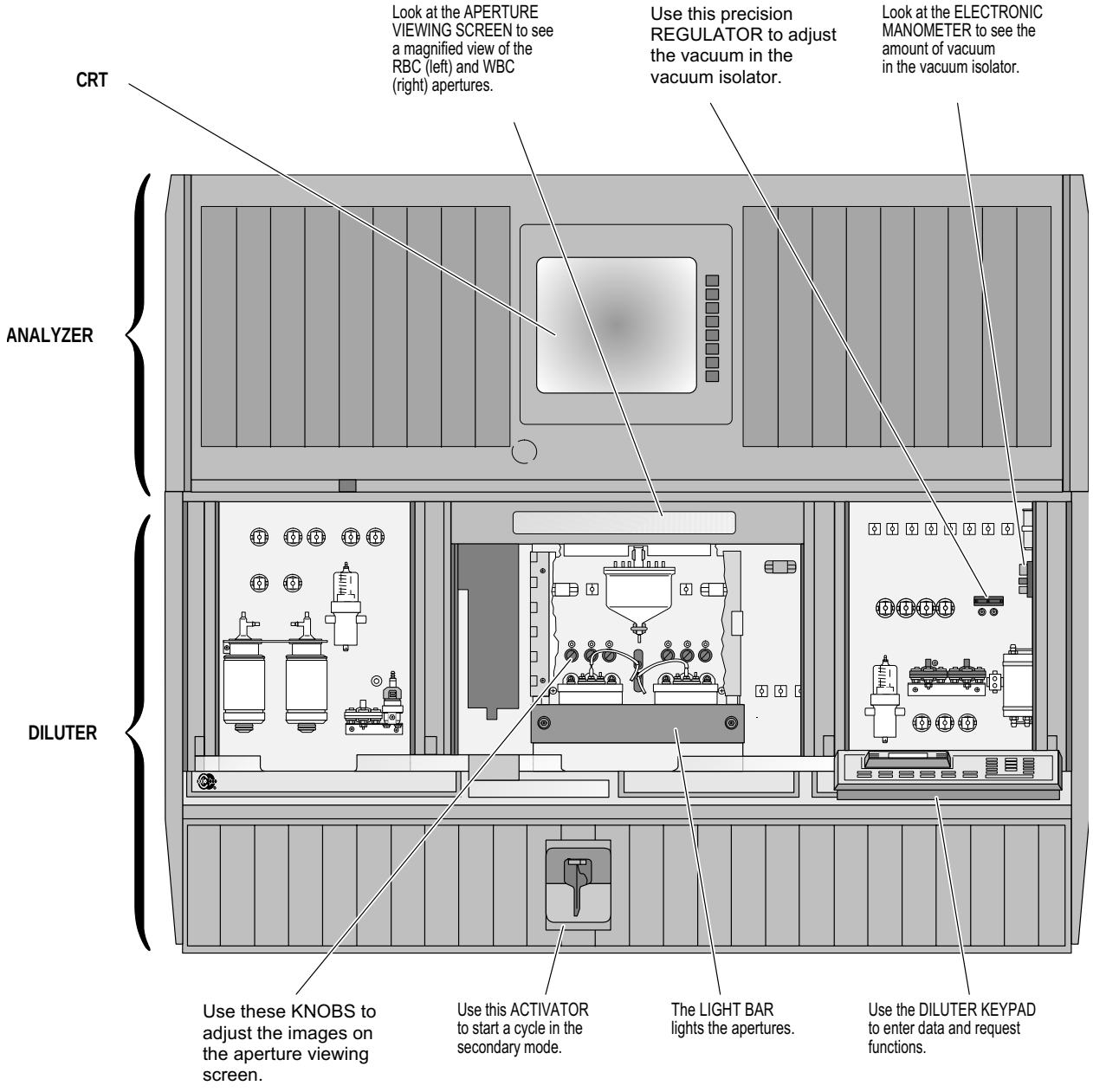
## MAIN UNIT


CRT
Look at the APERTURE VIEWING SCREEN to see a magnified view of the RBC (left) and WBC (right) apertures.
Use this precision REGULATOR to adjust the vacuum in the vacuum isolator.
Look at the ELECTRONIC MANOMETER to see the amount of vacuum in the vacuum isolator.
ANALYZER
DILUTER
Use these KNOBS to adjust the images on the aperture viewing screen.
Use this ACTIVATOR to start a cycle in the secondary mode.
The LIGHT BAR lights the apertures.
Use the DILUTER KEYPAD to enter data and request functions.
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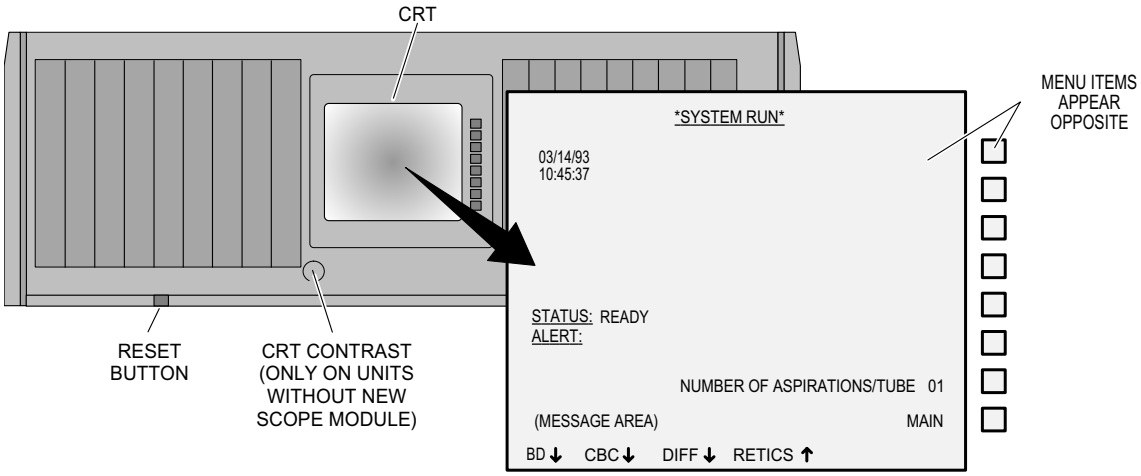
# ANALYZER




## ANALYZER CRT MENU SUMMARY

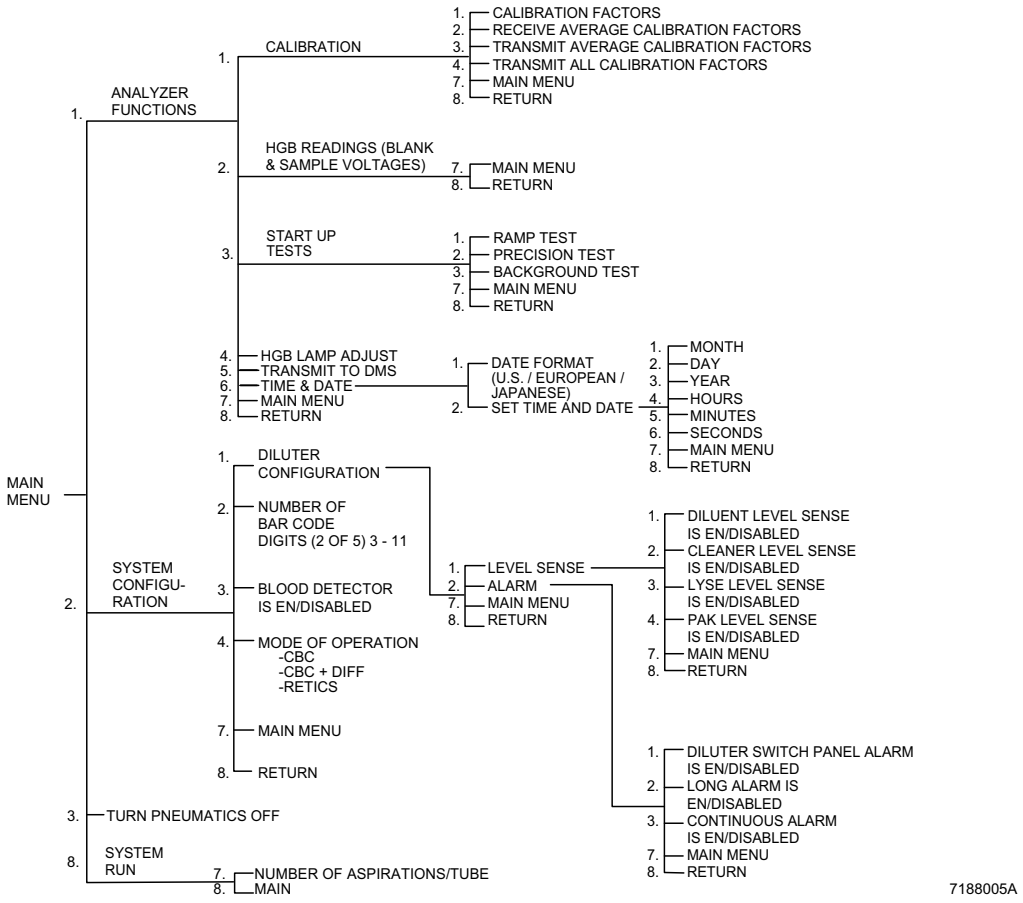


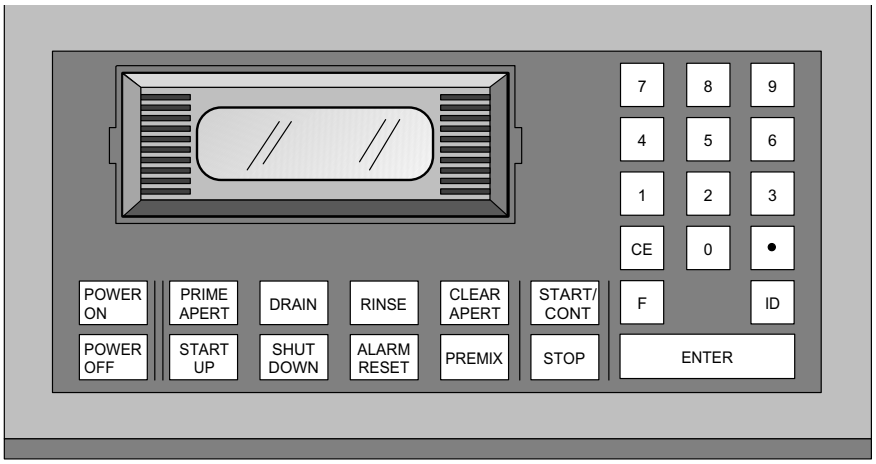
**Table 1 STATUS Messages on Analyzer CRT**

| Message | Meaning |
|---|---|
| *ACTIVE* | Occurs only in the Primary mode during a cycle. |
| *ANALYZE* | The system is analyzing the data for voting purposes. This message appears so quickly it may not be visible. |
| *AUTO CLEARING* | Occurs during automatic clearing of the flow cell. |
| *BACKWASH* | Diluent is flushing the rest of the sample from the Blood Sampling Valve (BSV) and its associated tubing and rinsing the aspirating mechanism. |
| *CHECKING PRESSURES* | Occurs while waiting for the pressures to reach an acceptable level for processing samples. |
| *COUNT* | The instrument is sensing. It is applying electrical current and regulated vacuum to the apertures. |
| *COUNT COMPLETED* | Appears at the end of the LATRON cycle when the count is completed. |
| *INTRO SAMPLE* | Occurs during sample aspiration. |
| *NOT READY* | The instrument is performing a task (such as Startup) and cannot receive another command. |
| *PRIME* | The system is priming itself before collecting data. |
| *READ HGB* | The system is measuring Hgb concentration photometrically. The Analyzer is computing parameters. This message appears so quickly it may not be visible. |
| *READY* | The instrument is ready for a command. |
| *READY (Retics must be diluted)* | Occurs when the instrument is ready in the Retics mode. |
| *RINSE* | The instrument is rinsing the baths with diluent. |
| *STKS INITIALIZING* | Occurs when you turn the system on and when you press the RESET button on the Analyzer. |
| *SYSTEM FAULT* | The instrument has detected a fault in the system. Check the ALERT message below the SYSTEM FAULT message. |
| *WIPE* | Occurs only in the Secondary mode. It means that aspiration is complete and prompts you to wipe the excess sample from the aspirator tip. |

ALERT messages on the Analyzer CRT are described in Special Procedures and Troubleshooting, PN 4237187.

See ANALYZER CRT FUNCTIONS chapter of this manual for description of functions available.

## DILUTER KEYPAD

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POWER ON

Turns on power to the Analyzer and Diluter.

PRIME APERT

When pneumatics are OFF:

- Activates pneumatics.
- Backwashes both modes.
- Drains and rinses baths.
- Primes Hgb and lyse pumps.
- Applies 6" vacuum to apertures to remove bubbles from lines.
- Turns on aperture current (burn cycle).
- Rotates and rinses mixing chamber.

When pneumatics are ON:

- Drains and rinses baths.
- Backwashes both modes.
- Applies 6" vacuum to apertures to remove bubbles from lines.
- Rotates and rinses mixing chamber.

Press during cycling in the Primary mode to increase light intensity for a better view of the apertures.

Press after ID when you are entering the 5C® and Retic-C cell control numbers for the Secondary mode.

DRAIN

Empties the RBC bath and vacuum isolator chambers into the waste chamber.

Empties the WBC bath through the Hgb cuvette into the waste chamber.

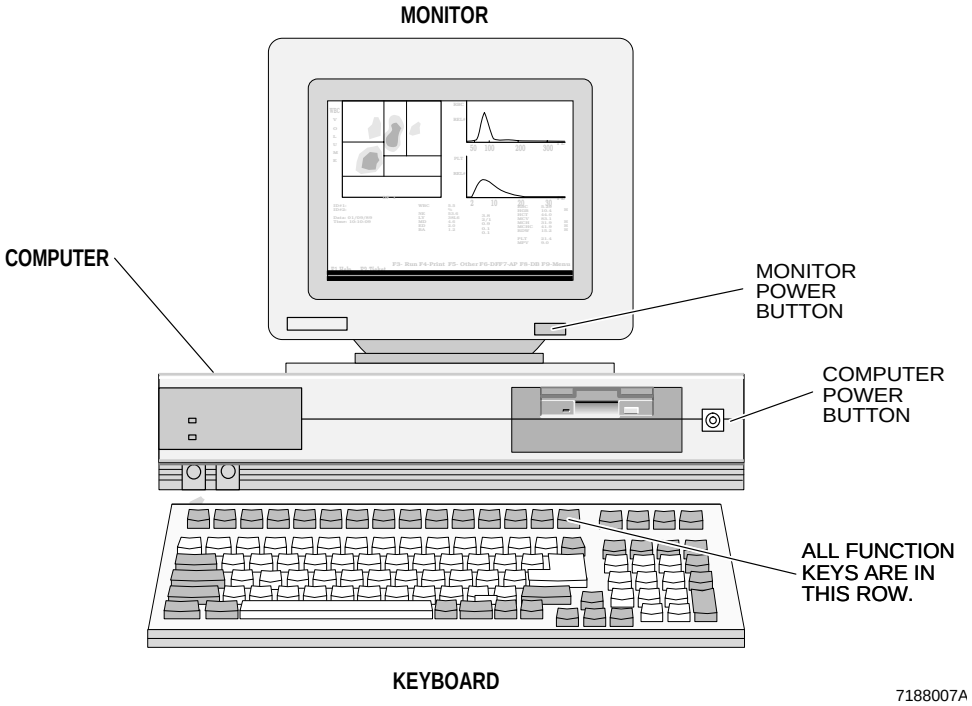
RINSE

Fills baths with diluent.

Empties the waste chamber.

Insert 11 x 17 pages here, pages 5 and 6. Page 6 has a menu summary but no page number on it.

# DMS MONITOR, COMPUTER AND KEYBOARD



before a key or procedure, tells you to use computer keys.

To select a menu item, use

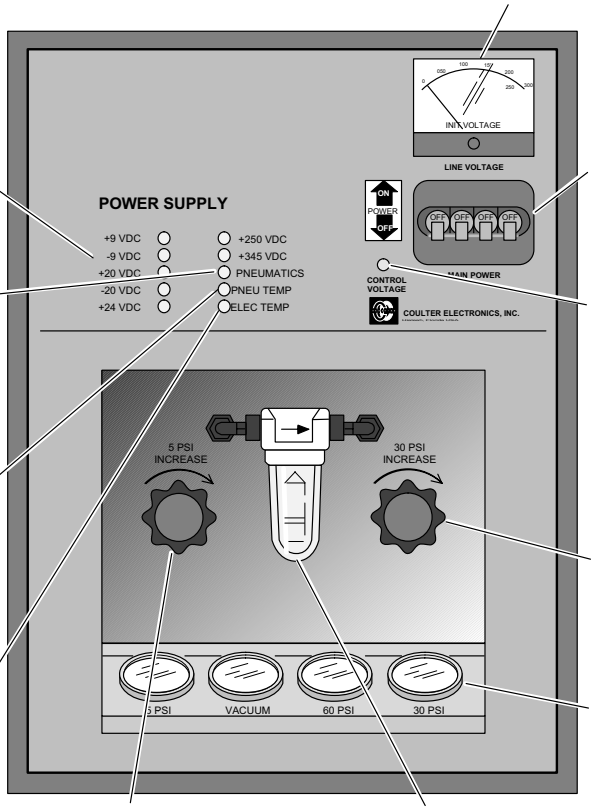
- ↓ ↑ → ← to move the highlighted menu bar, then press Enter

  OR

- Press the letter in contrasting color of the menu item you want to select.

See **DMS KEYS** in the DMS BASICS chapter of this manual for details of moving the cursor, saving and clearing data, displaying screens and messages, seeking and displaying help.

# POWER SUPPLY




The LINE VOLTAGE METER indicates that voltage is present.

The VOLTAGE LAMPS light when the power supply voltages are out of preset tolerance, or when the corresponding fuse is blown.

The MAIN POWER CIRCUIT BREAKER turns power to the System on and off.

The PNEUMATICS LAMP lights when the 60 PSI gauge is off or low (Vacuum≤17; pressure ≤45). During the cycle, a momentary vacuum drop below 17" Hg does not constitute a system failure.

The CONTROL VOLTAGE LAMP, when lit indicates sufficient voltage is present at the Diluter.

The PNEU TEMP (Pneumatic temperature) lamp lights when the pneumatic assembly is too hot: the pneumatics subsystem turns off.

Turn the 30 PSI KNOB to regulate the high pressure used to move components and move fluids through the Diluter.

The ELEC TEMP (Electronic temperature) lamp lights when the electronic assembly is too hot: the electronics assembly and the pneumatics subsystem turn off.

The PNEUMATIC GAUGES (4) indicate the amount of pressure and vacuum present.

Turn the 5 PSI KNOB to regulate the low pressure used for reagent level sensors, mixing bubbles and needle vent.

The VACUUM TRAP BOTTLE protects the vacuum pump from liquid. Liquid in this bottle indicates a problem. WARNING: May contain biohazardous material.

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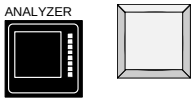
## ICONS

These icons show you how to use keypads of the Analyzer, Diluter and DMS.

When you need to use keystrokes, the keys to press follow the icon that shows you which keypad to use.




The second grouping asks you to press the POWER ON key of the Diluter keypad. For example:

If the power is off, press

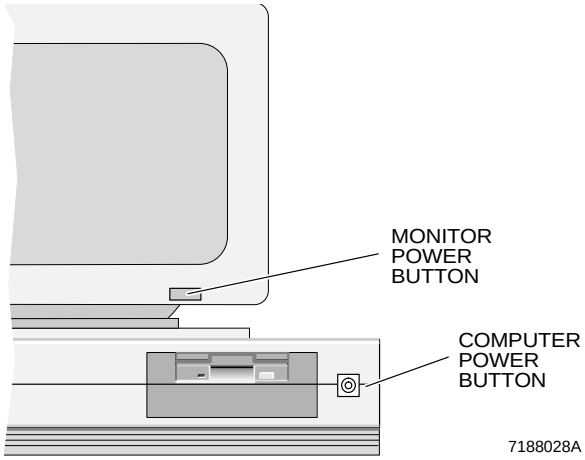
and wait 30 minutes for warmup.

## CHECK REAGENTS

Check for sufficient reagent quantities before you begin the Startup procedure.

## AT THE DMS

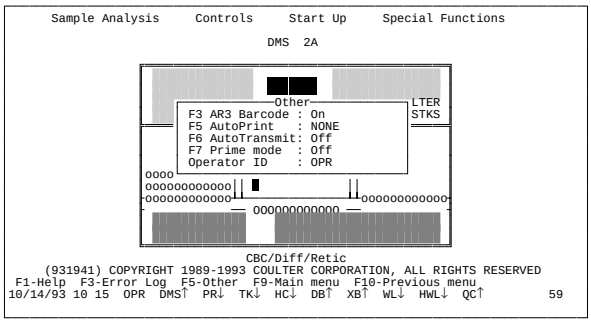
1. Turn ON the computer and monitor.



2. From the Main Menu select **F5** **Other**.

3. The cursor is in the **Operator ID** field. Enter your Operator Code.

4. Check that **AutoPrint** is set to NONE.


Sample Analysis Controls Start Up Special Functions
DMS 2A
Other
F3 AR3 Barcode : On
F5 AutoPrint : NONE
F6 AutoTransmit: Off
F7 Prime mode : Off
Operator ID : OPR
LTER
STKS
CBC/Diff/Retic
(931941) COPYRIGHT 1989-1993 COULTER CORPORATION, ALL RIGHTS RESERVED
F1-Help F3-Error Log F5-Other F9-Main menu F10-Previous menu
10/14/93 10 15 OPR DMS↑ PR↓ TK↓ HC↓ DB↑ XB↑ WL↓ HWL↓ QC↑ 59

5. Press **F9** to return to Main Menu.

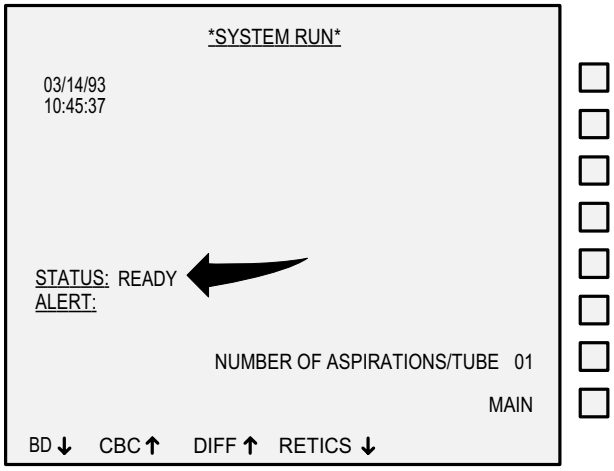
6. DMS Select **Start Up**.

## AT THE ANALYZER CRT

ANALYZER

1. Check for the READY message. If there is none, press the Analyzer reset button.

   If your system has a CRT contrast wheel, and the CRT has no oscilloscope pulses, use the contrast wheel to adjust the contrast as needed.

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2. See if all settings are in accord with your laboratory's policies.

   If not, change settings by pressing the key next to each.

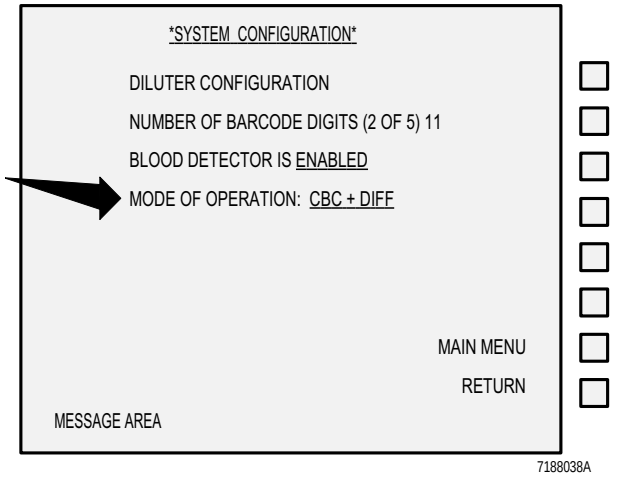
Press in sequence the key next to

MAIN

SYSTEM CONFIGURATION

MODE OF OPERATION

Set to CBC+DIFF




DILUTER CONFIGURATION

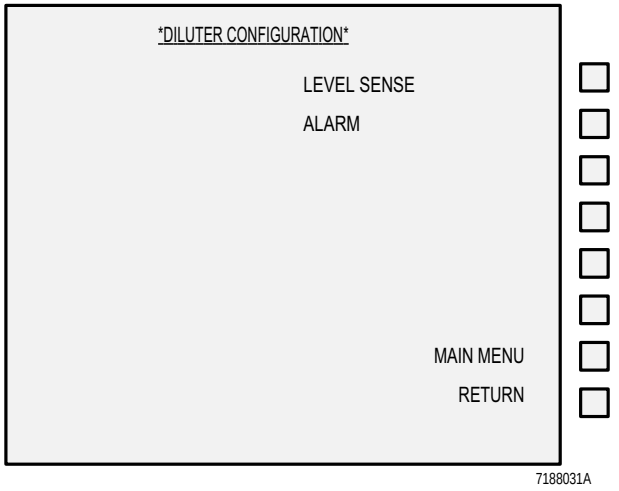
LEVEL SENSE
Check settings.

RETURN

ALARM
Check settings.

MAIN MENU

SYSTEM RUN



## AT THE POWER SUPPLY

**CAUTION**

**Do not operate the instrument if any indicator is outside the following limits.**

The pneumatic subsystem has an automatic shutoff feature to prolong the life of the compressor and vacuum pump. If the Diluter is not cycled for about one hour, the pneumatic subsystem turns off. Some error messages can inhibit the time out function.

If the pneumatics are off,

PRIME
APERT

1. Verify that:

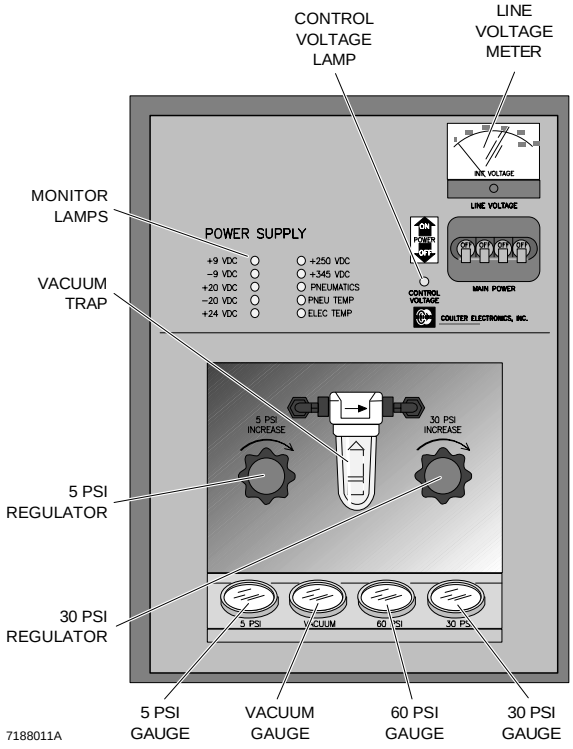
   - LINE VOLTAGE meter is between 105 V and 125 V (or 210 V - 250 V).
   - CONTROL VOLTAGE lamp is lit.
   - All MONITOR LAMPS are unlit.

**WARNING**

**The contents of the vacuum trap bottle may include residual biological material and must be handled with care. Avoid skin contact and clean up spills immediately. Dispose of the liquid following acceptable laboratory procedures.**

   - Vacuum trap is free of liquid.

     If there is liquid, see the Vacuum Trap section in Special Procedures and Troubleshooting, PN 4237187.



2. Check the gauge readings. Verify that:

   - 5 PSI is exactly 5 psi. If not, adjust with the 5 PSI regulator.
   - VACUUM is 22" Hg minimum at sea level.
   - 60 PSI is 60 ± 5 psi.
   - 30 PSI is 30 ± 1 psi. If not, adjust with the 30 PSI regulator.

If VACUUM or 60 psi is out of range, call

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CUSTOMER OPERATIONS
1-800-526-7694

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## AT THE DILUTER

1. Verify that

   - the top bar on the electronic manometer is in the green range.

     If not, move the vacuum adjust regulator

     - to the right to decrease the level, or
     - to the left to increase it.

     **Do not adjust by more than two bars.** If you need to adjust the manometer more than two bars,

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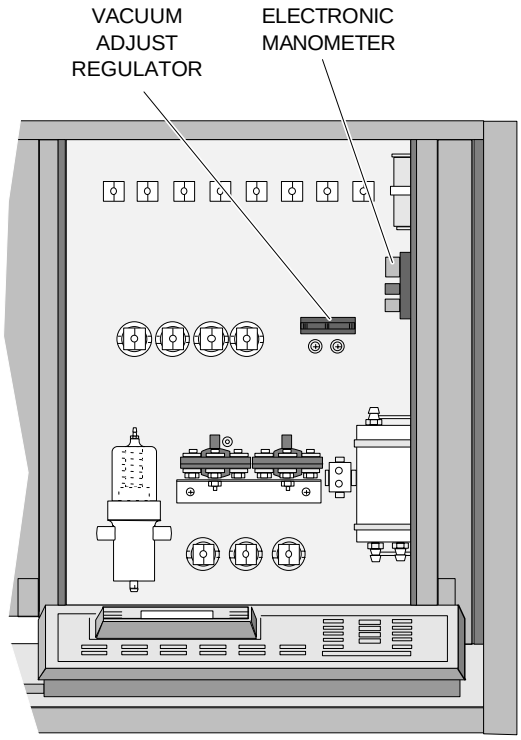


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2. Verify proper Diluter function.

   To see better, pull the light bar straight out toward you and lay it aside.

   DILUTER

   DRAIN

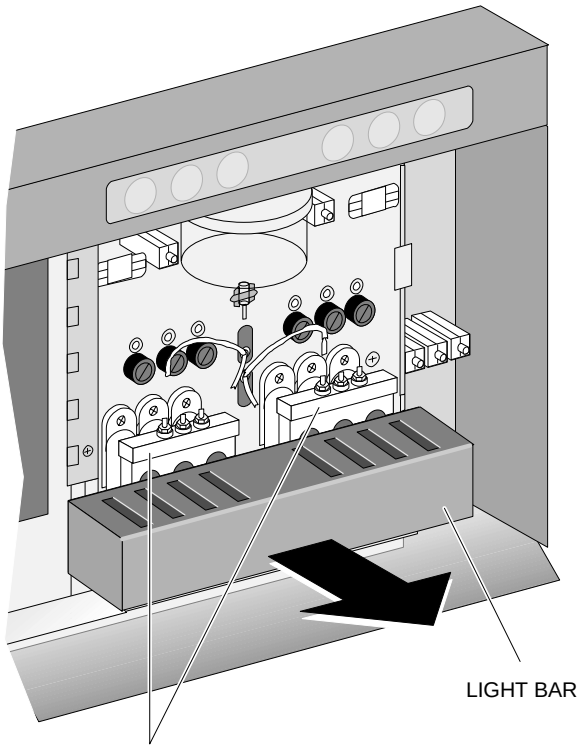
   Check that

   - both aperture baths drain completely.

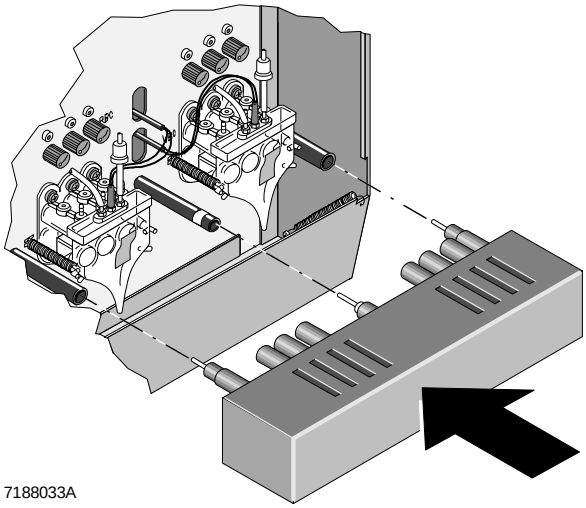
   DILUTER

   RINSE

   - both baths fill with liquid.
   - waste chamber drains.




3. Push the light bar straight back into its sockets.



4.

START UP

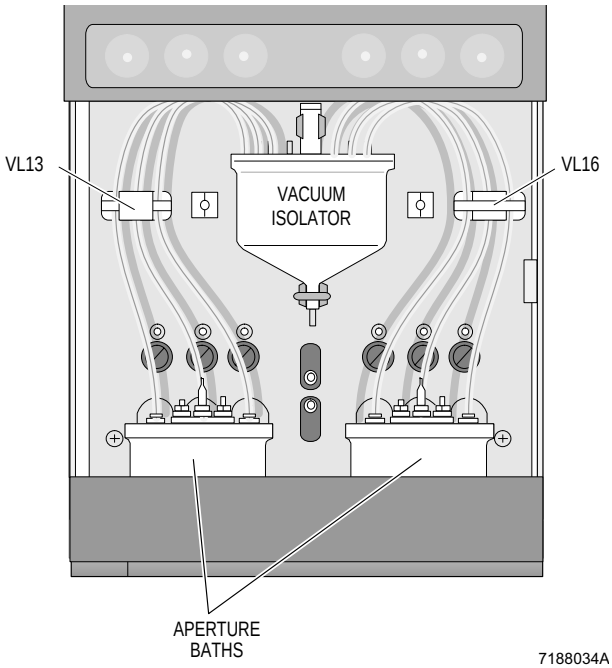
for the automatic Start Up cycles. The system:

- Converts from cleaning agent to diluent.
- Performs a background count in the baths.
- Measures Hgb-blank and Hgb-sample voltages.
- Performs ramp-pulse and precision-pulse tests.
- Performs an electronic check of the Triple Transducer Module.

5. Watch the cycles for normal reagent flow.

When COUNT appears on the Analyzer CRT, check that:

- There are no bubbles in the 3 lines from each of the aperture baths, which run through VL13 and VL16, to the vacuum isolator.
- Diluent drips steadily from these lines into the vacuum isolator.
- You can see all six apertures on the viewing screens and apertures are free of debris.
- The startup has removed all traces of cleaning agent from diluent dispensers, baths and associated tubing. (Some cleaning agent may remain behind the aperture baths.)



## CHECK STARTUP RESULTS

1. Look at the START UP screen when results appear on the DMS. Check background results. The preset tolerances are:

   | | |
   |---|---|
   | WBC | 0.20 |
   | RBC | 0.01 |
   | Hgb | 0.15 |
   | Plt | 3.00 |

   Out-of-limit background results are in red and are flagged H (High) or L (Low).

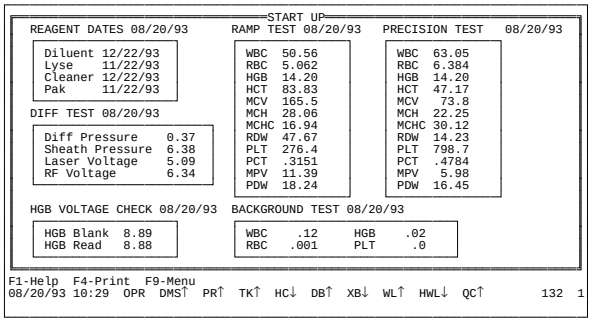
   If an incomplete computation (...) of the Hgb parameter occurs, verify that the Hgb-blank and Hgb-read voltages are acceptable according to the guidelines in step 2. If the step 2 voltages are acceptable, the dots (...) for the Hgb parameter are acceptable.

   If the background results are not acceptable, go to step 3.

2. Verify that the Hgb readings are within limits. The criteria for the Hgb readings are:

   - The Hgb-blank and Hgb-read voltages are within 7.500 to 9.500.
   - The Hgb-blank voltage is within ±0.075 V of the Hgb-read voltage.
   - The Hgb-blank voltage is within ±0.150 V of the Hgb-blank voltage for the previous day.
   - The Hgb-read voltage is within ±0.150 V of the Hgb-read voltage for the previous day.

   If the readings do not meet these criteria, go to step 3.



3. If the background results or Hgb readings do not meet the criteria listed in steps 1 and 2, repeat the Background test at the Analyzer CRT. The Background test includes Hgb voltage check and diff test.

   
   Press in sequence the key next to

   MAIN

   ANALYZER FUNCTIONS

   STARTUP TESTS

   BACKGROUND TEST

   If results are still not acceptable, call Coulter Customer Operations. Return to the System Run display.

4. Check the ramp and precision tests. If any test value exceeds the reference value by 1% or more, the test value appears in red on the DMS screen and is flagged with an H (high) or L (low) flag. If a flag occurs:

   a.
   
   Select

   **Special Functions**
   **Set Up**
   **System Set Up**
   **Electronic Reference**

   to see if the values are correct.

   b. See if your laboratory has calibrated the instrument recently.

- If so, did laboratory establish and enter new ramp and precision values?
- If not, you need to do so.

c. Check that clean diluent covers the apertures, and that there is no bleach or cleaning agent in the baths.

d. Repeat the ramp or precision test.

Press keys next to

ANALYZER FUNCTIONS

START UP TESTS

RAMP TEST

or

PRECISION TEST

e. If you see a flag this time,

IN THE USA
COULTER
CUSTOMER OPERATIONS
1-800-526-7694

7188032A

5.


Print a copy on the Graphic Printer. Record results in your logbook.

# DAILY QUALITY CONTROL

**IMPORTANT**

**When 100 total runs are stored in a control file, *FILE IS FULL* appears on the error line.**

## LATRON

LATRON verifies flow cell alignment, gains and CVs for flow cell volume, conductivity and scatter.

You can use LATRON to monitor Diff and Retic modes in three different ways. Each method uses a different Diluter function. Each requires approximately 1.5 mL of LATRON.

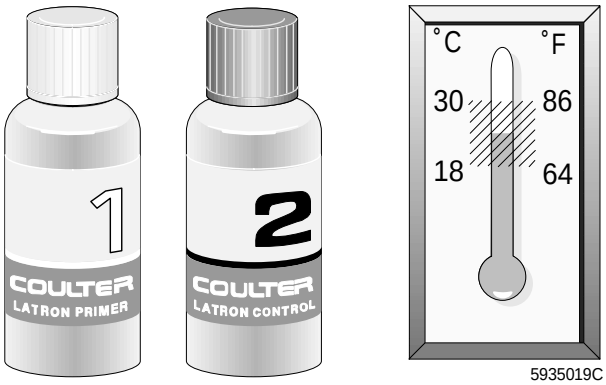
Functions for using LATRON:

- Diff only - F55
- Retic only - F56
- Diff + Retic - F57

Coulter recommends using F57 for monitoring Diff and Retics with the LATRON.

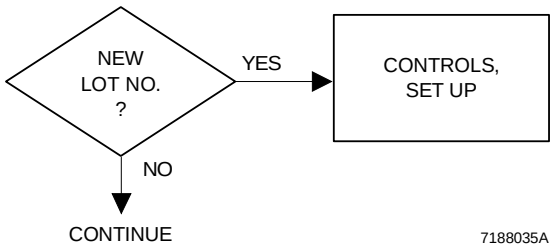
The following procedure is for Diff + Retic. If you are using LATRON for Diff only or Retics only, choose the appropriate function. For most efficient reagent use, use the function for what you are going to run.

1. Make sure the COULTER LATRON primer and control are within the correct temperature range before use.



5935019C

2.



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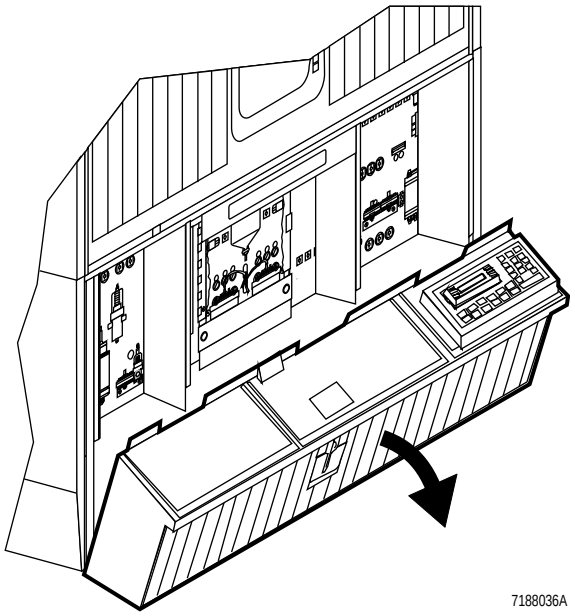
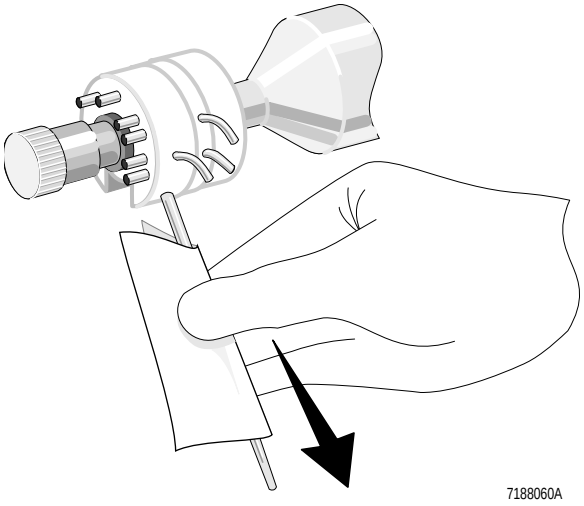
3. Pull open the lower front cover.




4. Wipe the aspirator tip thoroughly using distilled water and a lint-free tissue.




5. Lift the lower front cover back into place.

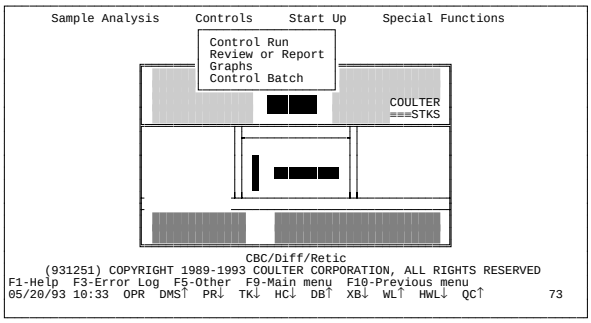
6.

PRIME
APERT

7. DMS Select

   **Controls**
   **Control Run**

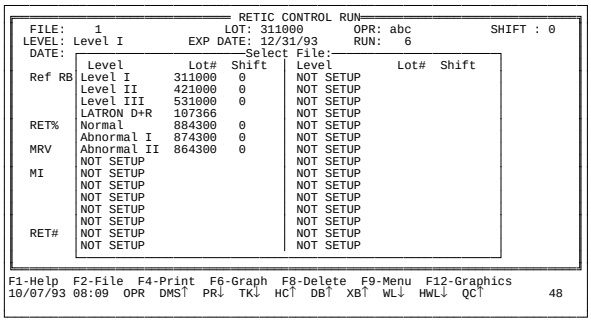
   Press **Enter**




8. Press **F2 File** if the file you want is not on the screen.

9. In the Select file window, move the cursor to the file you want.

   Press **Enter**.


RETIC CONTROL RUN
FILE: 1 LOT: 311000 OPR: abc SHIFT : 0
LEVEL: Level I EXP DATE: 12/31/93 RUN: 6
DATE:
Select File:
Level Lot# Shift Level Lot# Shift
Ref RB Level I 311000 0 NOT SETUP
Level II 421000 0 NOT SETUP
Level III 531000 0 NOT SETUP
LATRON D+R 107366 NOT SETUP
RET% Normal 884300 0 NOT SETUP
Abnormal I 874300 0 NOT SETUP
MRV Abnormal II 864300 0 NOT SETUP
NOT SETUP NOT SETUP
MI NOT SETUP NOT SETUP
NOT SETUP NOT SETUP
NOT SETUP NOT SETUP
NOT SETUP NOT SETUP
NOT SETUP NOT SETUP
RET# NOT SETUP NOT SETUP
NOT SETUP NOT SETUP
F1-Help F2-File F4-Print F6-Graph F8-Delete F9-Menu F12-Graphics
10/07/93 08:09 OPR DMS↑ PR↓ TK↓ HC↑ DB↑ XB↑ WL↓ HWL↓ QC↑ 48

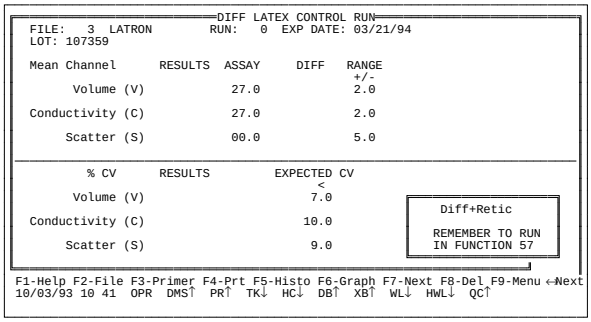
   The selected CONTROL RUN file appears.

   The box in the lower right corner of the screen tells you which mode you are in and which function to use for this mode.

   In a Diff + Retic Latex file,

   ← and →

   toggle between DIFF and RETIC displays.


DIFF LATEX CONTROL RUN
FILE: 3 LATRON RUN: 0 EXP DATE: 03/21/94
LOT: 107359
Mean Channel RESULTS ASSAY DIFF RANGE +/-
Volume (V) 27.0 2.0
Conductivity (C) 27.0 2.0
Scatter (S) 00.0 5.0
% CV RESULTS EXPECTED CV <
Volume (V) 7.0
Conductivity (C) 10.0
Scatter (S) 9.0
Diff+Retic
REMEMBER TO RUN IN FUNCTION 57
F1-Help F2-File F3-Primer F4-Prt F5-Histo F6-Graph F7-Next F8-Del F9-Menu ←Next
10/03/93 10 41 OPR DMS↑ PR↑ TK↓ HC↓ DB↑ XB↑ WL↓ HWL↓ QC↑

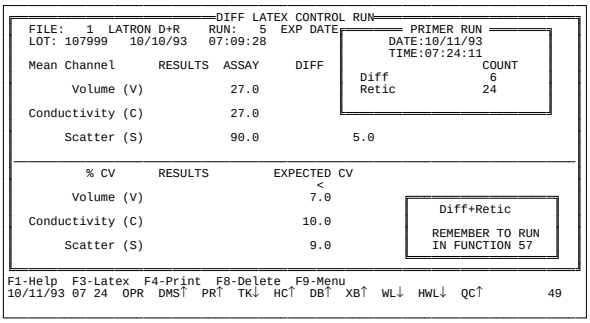
10. Press **F3 Primer**.

**IMPORTANT**

**Use the correct Diluter function when you run the primer.**

**CAUTION**

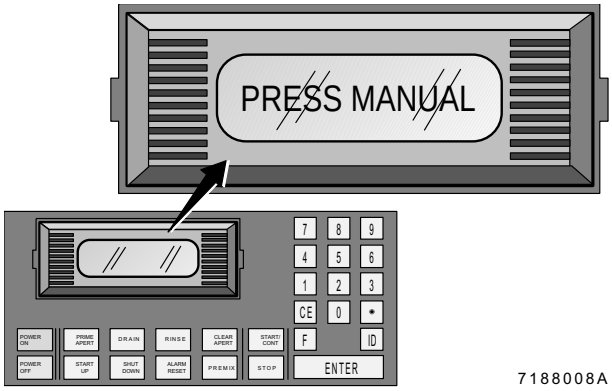
**Use of F55, F56 or F57 for anything other than the LATRON procedure can damage the instrument.**



11. DILUTER

| F | 5 | 7 | ENTER |
|---|---|---|---|

**PRESS MANUAL** means the system is ready for you to press the activator.




12. a. Immerse the aspirator tip in the LATRON primer vial.

b. Press and release the activator.

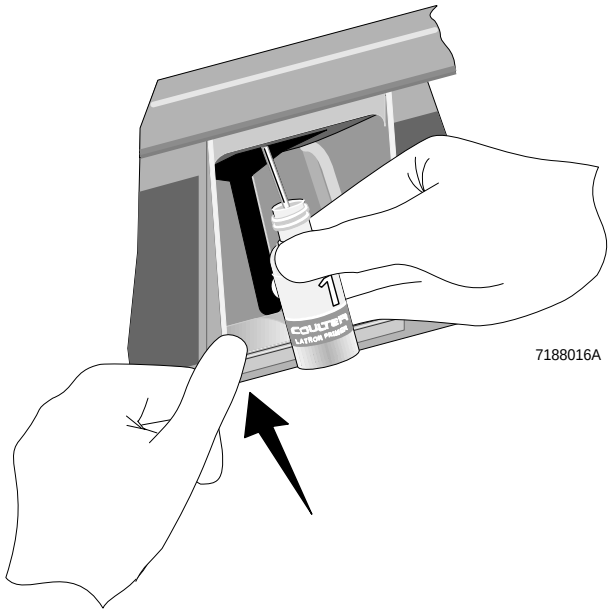
DILUTER

Message is *LATRON DIFF + RET* even though you are cycling primer.

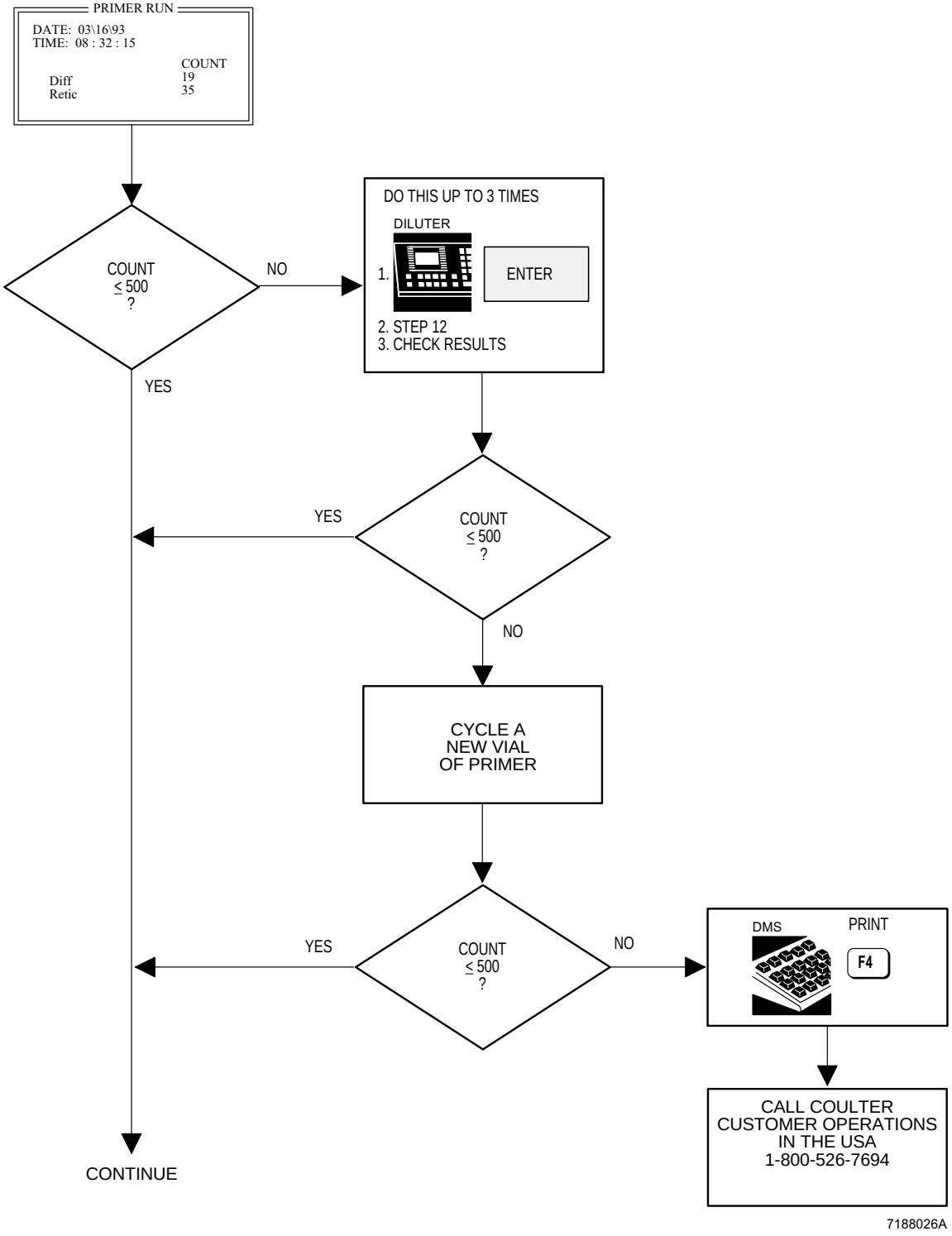
c. Remove the primer when

- you hear the beep and
- the Analyzer CRT STATUS field displays *WIPE*.

d. Wipe the tip with a lint-free tissue.



13.


PRIMER RUN
DATE: 03\16\93
TIME: 08 : 32 : 15
COUNT
Diff 19
Retic 35
COUNT ≤ 500 ?
NO
YES
DO THIS UP TO 3 TIMES
DILUTER
1.
ENTER
2. STEP 12
3. CHECK RESULTS
COUNT ≤ 500 ?
YES
NO
CYCLE A NEW VIAL OF PRIMER
COUNT ≤ 500 ?
YES
NO
DMS
PRINT
F4
CALL COULTER CUSTOMER OPERATIONS IN THE USA 1-800-526-7694
CONTINUE
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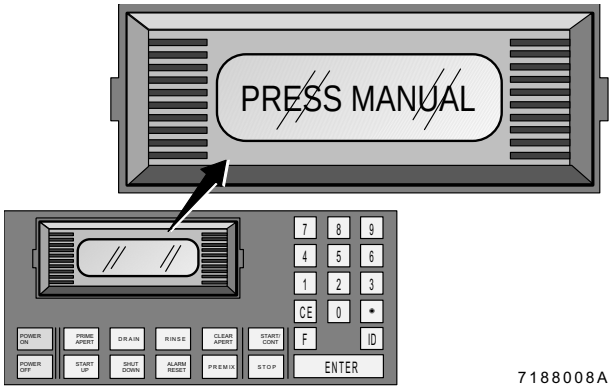
14. DMS **F3** **Latex**

15. DILUTER ENTER

    to reactivate function 57.



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16. Gently mix the control. Invert the vial five to eight times. Avoid foaming.

7188010A

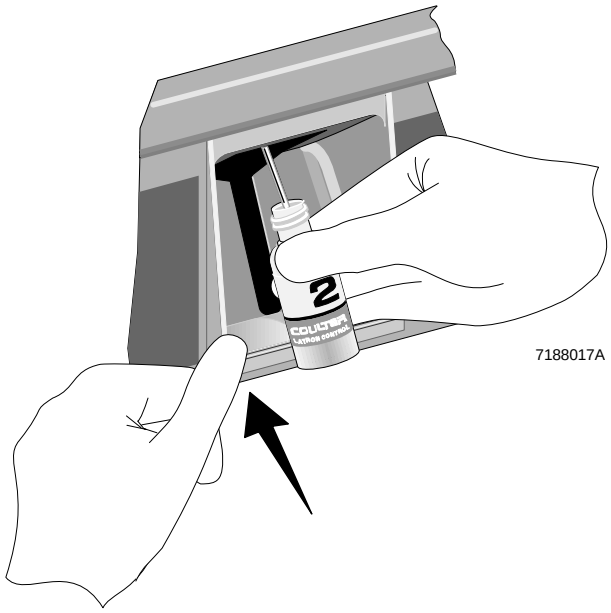
17. a. Immerse the aspirator tip in the LATRON control vial.

    b. Press and release the activator.

    c. Remove the control when

    - you hear the beep and
    - the Analyzer CRT STATUS field displays *WIPE*.

    d. Wipe the tip with a lint-free tissue.



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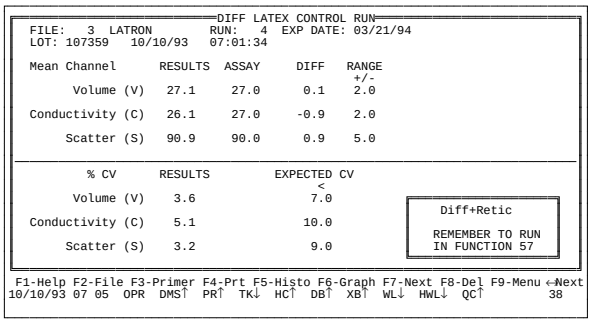
18. When results appear, check for H (High) or L (Low) beside the results and for error messages at the bottom of the screen.

    If results are out of limits, see Table 2.

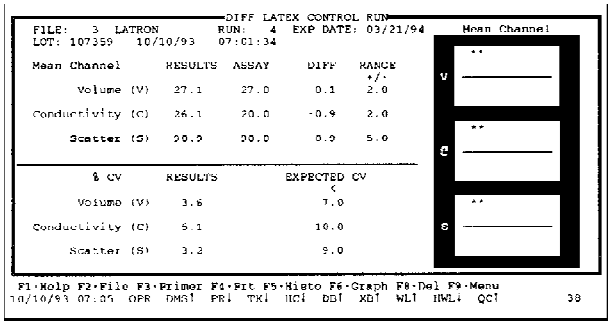

DIFF LATEX CONTROL RUN
FILE: 3 LATRON
RUN: 4
EXP DATE: 03/21/94
LOT: 107359 10/10/93 07:01:34
Mean Channel RESULTS ASSAY DIFF RANGE +/-
Volume (V) 27.1 27.0 0.1 2.0
Conductivity (C) 26.1 27.0 -0.9 2.0
Scatter (S) 90.9 90.0 0.9 5.0
% CV RESULTS EXPECTED CV <
Volume (V) 3.6 7.0
Conductivity (C) 5.1 10.0
Scatter (S) 3.2 9.0
Diff+Retic
REMEMBER TO RUN IN FUNCTION 57
F1-Help F2-File F3-Primer F4-Prt F5-Histo F6-Graph F7-Next F8-Del F9-Menu ←Next
10/10/93 07 05 OPR DMS↑ PR↑ TK↓ HC↑ DB↑ XB↑ WL↓ HWL↓ QC↑ 38

    Use ← and → to toggle between DIFF and RETIC.

19. Press **F4** to print the results for your logbook.

20. If you want to see graphs of the last 10 cycles, press **F6** **Graph**.

    To switch between Mean Channel and %CV graphs, press **F6** **Graph** again.


DIFF LATEX CONTROL RUN
FILE: 3 LATRON
RUN: 4
EXP DATE: 03/21/94
LOT: 107359 10/10/93 07:01:34
Mean Channel
Mean Channel RESULTS ASSAY DIFF RANGE +/-
Volume (V) 27.1 27.0 0.1 2.0
Conductivity (C) 26.1 27.0 -0.9 2.0
Scatter (S) 90.9 90.0 0.9 5.0
% CV RESULTS EXPECTED CV <
Volume (V) 3.6 7.0
Conductivity (C) 5.1 10.0
Scatter (S) 3.2 9.0
F1-Help F2-File F3-Primer F4-Prt F5-Histo F6-Graph F8-Del F9-Menu
10/10/93 07:05 OPR DMS↑ PR↑ TK↓ HC↑ DB↑ XB↑ WL↓ HWL↓ QC↑ 38

7188085A

21.

    STOP

    clears the function showing.

    To review the control files and graphs, see LATEX CONTROL FILE REVIEW in the CONTROLS chapter.

**Table 2 When LATRON is Out of Limits**

| Possibility | Action |
|---|---|
| LATRON control file was set up incorrectly. | Verify that the assigned values and ranges in the control file match those on the LATRON package insert. If they do not, correct them in the DMS **Special Functions/Control Set Up**. |
| Bubble or improper vial handling | 1. Rerun the primer and then the control. If the control is still "out," go to step 2.<br>2. Use F13, Purge, then run the primer and control again. If the control is still "out," go to the next possibility. |
| Control is:<br>• contaminated<br>• improperly mixed<br>• past open-vial expiration date | Try a new vial of LATRON control after verifying that the aspirator tip is clean and dry. Mix gently according to directions on the package insert. |
| Instrument problem | 1. Use F44, CLEAR FLOW CELL 1.<br>2. If you see the flow cell clogged message on the CRT, use F45, CLEAR FLOW CELL 2, up to 3 times.<br>3. If the flow cell remains clogged, aspirate LATRON primer, using F55, up to 3 times.<br>4. If it is still clogged, use F46, CLEAR FLOW CELL 3, and leave the instrument idle for 30 minutes.<br>5. Use F44, CLEAR FLOW CELL 1.<br>6. Press PRIME APERT.<br>7. Use F55, F56 or F57 and cycle LATRON primer and control.<br>8. If the control is still "out," set system to CBC mode. Call Coulter Customer Operations for help. |

## RETIC-C Cell Control

Retic-C cell control, designed to be used with the COULTER ReticPrep reagent kit, monitors the reticulocyte technology using assessments of volume, conductivity and scatter.

**IMPORTANT**

**Perform the reticulocyte dilution method according to the instructions on the package insert and below. Modifications to the procedure, or failure to follow these instructions, may lead to misleading or erroneous results.**

1. ANALYZER

   Set the MODE OF OPERATION to RETICS so that

   CBC↓ DIFF↓ RETICS↑.

   MAIN

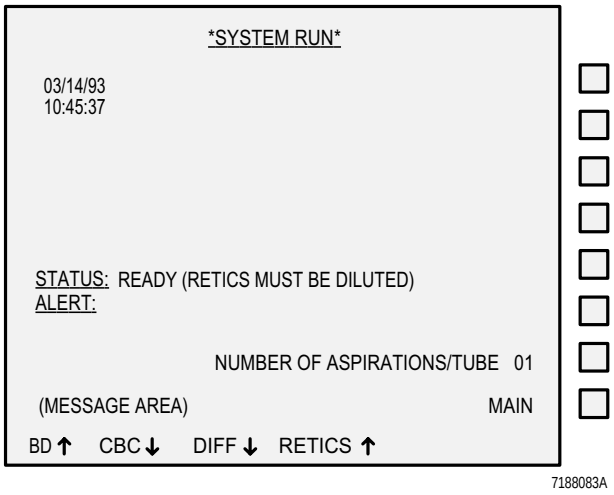
   SYSTEM CONFIGURATION

   MODE OF OPERATION
   Press the key opposite the test configuration to set to RETICS.

   MAIN MENU

   or

   RETURN

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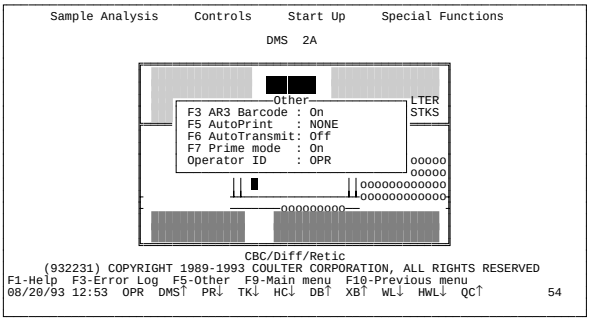
2. If you want to turn the AutoStop option on, see AutoStop in the CONTROLS chapter.

3. DMS At the Main Menu, press

   **F5 Other**

   **F7 Prime** to turn Prime ON

   **Esc**


Sample Analysis Controls Start Up Special Functions
DMS 2A
Other
F3 AR3 Barcode : On
F5 AutoPrint : NONE
F6 AutoTransmit: Off
F7 Prime mode : On
Operator ID : OPR
LTER
STKS
CBC/Diff/Retic
(932231) COPYRIGHT 1989-1993 COULTER CORPORATION, ALL RIGHTS RESERVED
F1-Help F3-Error Log F5-Other F9-Main menu F10-Previous menu
08/20/93 12:53 OPR DMS↑ PR↓ TK↓ HC↓ DB↑ XB↑ WL↓ HWL↓ QC↑ 54

4. Press

   DILUTER PRIME APERT

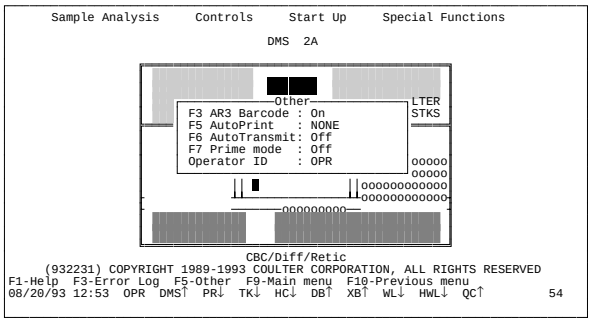
5. Cycle a prepared reticulocyte sample as a prime.

6. DMS Press **F5 Other**, then

   **F7 Prime**

   to turn Prime off.

   **Esc**



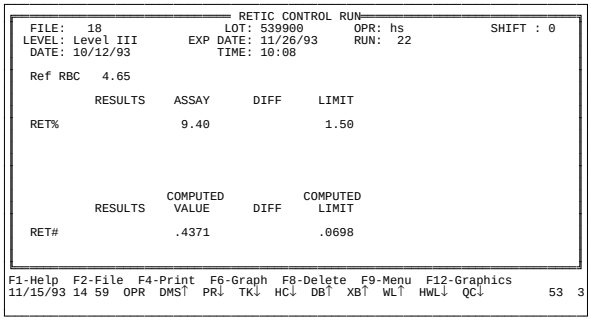

7. DMS Select

   **Controls**
   **Control Run**

   Press **F2 File**.

   Move the cursor to the file you want.

   Press **Enter**.



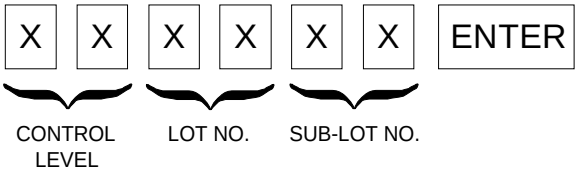

8. For the DMS to automatically save the control results in the proper file, press

   DILUTER

   [ID] [PRIME APERT]

   [0] [3]

   then enter the 6-digit control lot number.

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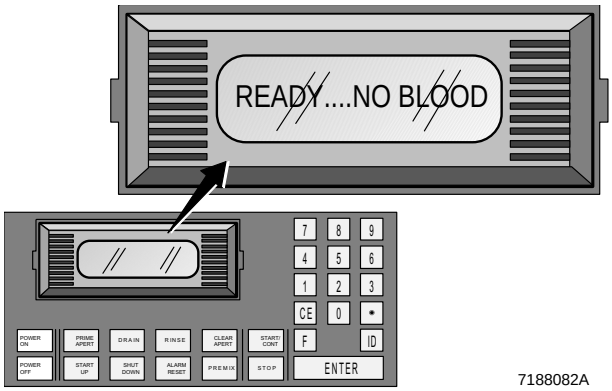
The message on the Diluter keypad is *READY....NO BLOOD*.



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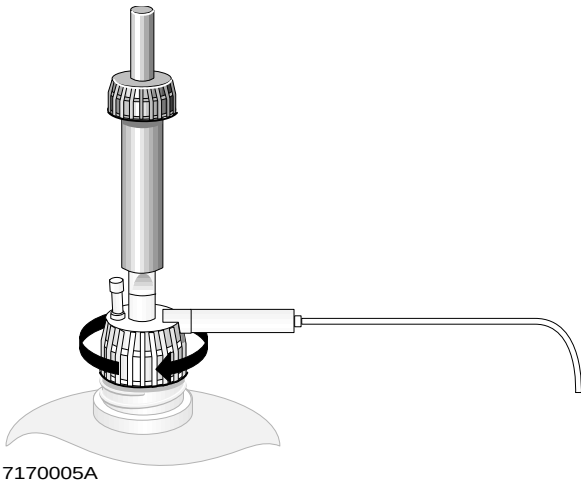
9. Make sure the repipetter is fitted securely to the Reagent B bottle.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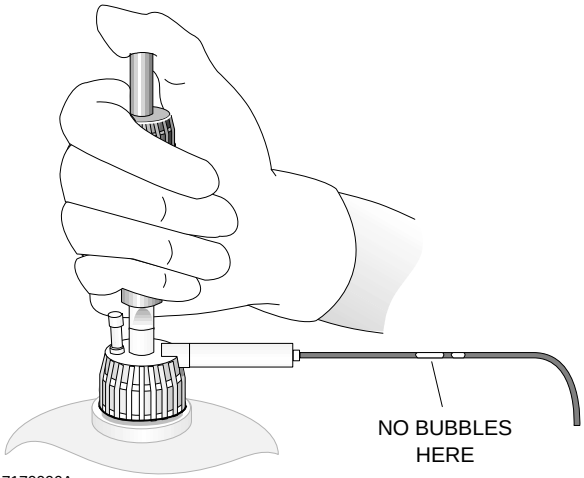
10. Prime Reagent B, making sure Reagent B fills the clear tubing of the repipetter.



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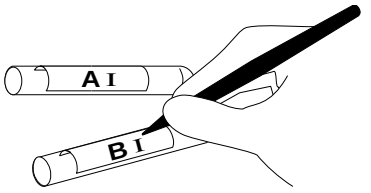
11. For each level of control, label two glass test tubes: one for Reagent A and one for Reagent B. Mark the control level on both tubes.



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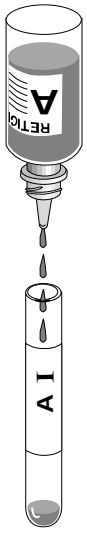
**IMPORTANT**

**Dispensing reagent at an angle changes the dilution of the preparation.**

12. Holding the dropper bottle vertically, place 4 drops of Reagent A into the "A" tube.



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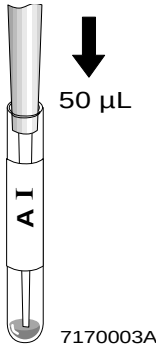
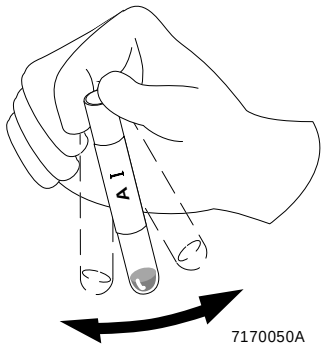
13. Dispense 50 µL of well-mixed Retic-C cell control into the "A" tube. Add directly to the stain and do not let control run down side of tube.



7170003A

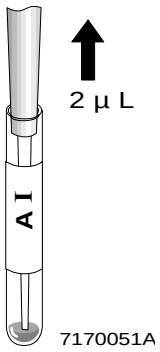
14. Gently mix "A" tube.



7170050A

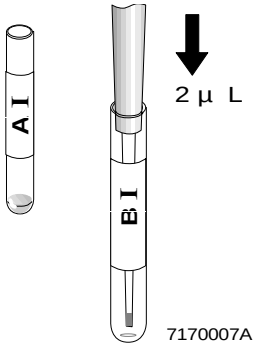
15. Incubate for a minimum of 5 minutes at room temperature of 16 - 30°C (61 - 86°F). Up to 60 minutes is OK.

16. Gently mix "A" tube. Aspirate 2 µL of the sample/stain mixture from "A" tube.




**IMPORTANT**

**To prevent drying of this small amount of sample, when you finish step 17, go immediately to step 18. Read step 18 and the IMPORTANT that goes with it now.**

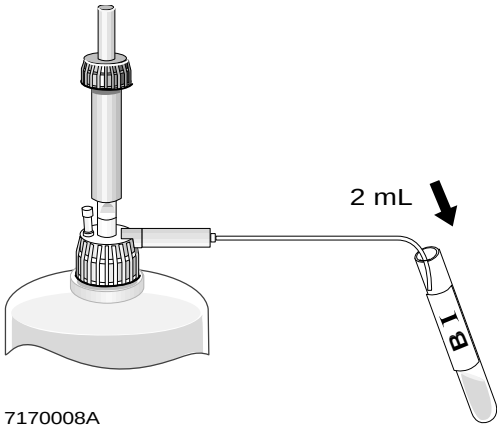



17. Dispense 2 µL of the sample/stain mixture directly into the bottom of the "B" tube. Do not let it run down side of tube.

**IMPORTANT**

**To keep bubbles or foam from forming, let Reagent B run down the side of the tube.**

**Dispense Reagent B quickly enough to mix the reagent and blood mixture. DO NOT MIX FURTHER.**

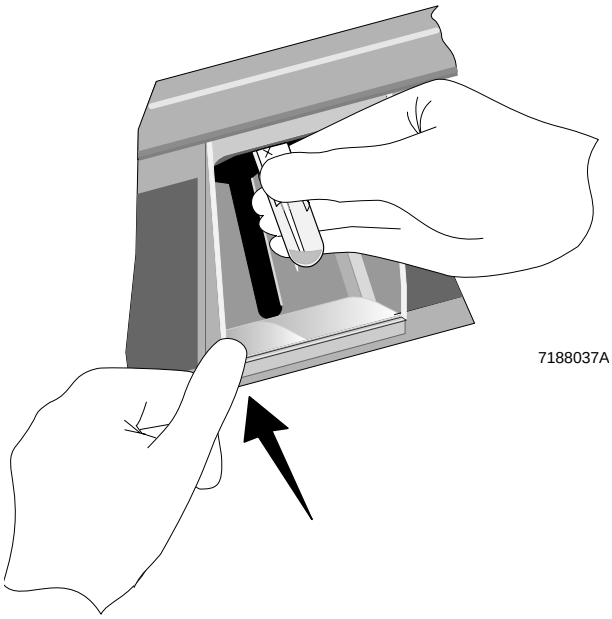



18. Place tube "B" at a 30° angle under the tip of the Reagent B dispenser. Dispense 2 mL of Reagent B in the "B" tube. Do not mix.

19. Wait 30 seconds then analyze the prepared sample:

    a. Immerse the aspirator tip in the dilution.

    b. Press and release the activator.




---

**IMPORTANT**

**Do not remove the sample tube from the aspirator tip until the STATUS message on the Analyzer CRT changes from INTRO SAMPLE to WIPE, and there is a beep.**

---

    c. Remove the prepared control when

        - you hear the beep and
        - the Analyzer CRT STATUS field displays WIPE.

    d. Wipe the tip with a lint-free tissue.

20. Check the results on the RETIC CONTROL RUN screen.

```
                              RETIC CONTROL RUN
  FILE:   18                LOT: 539900       OPR: hs            SHIFT : 0
 LEVEL: Level III       EXP DATE: 11/26/93     RUN:  22
  DATE: 10/12/93            TIME: 10:08

  Ref RBC   4.65

           RESULTS    ASSAY      DIFF     LIMIT

  RET%      9.22       9.40      -.180     1.50




                    COMPUTED             COMPUTED
           RESULTS    VALUE      DIFF      LIMIT

  RET#      .4289      .4371     -.0082    .0698


F1-Help  F2-File  F4-Print  F6-Graph  F8-Delete  F9-Menu  F12-Graphics
11/15/93 14 59  OPR  DMS↑  PR↓  TK↓  HC↓  DB↑  XB↑  WL↑  HWL↓  QC↓          53  3
```

To see the RET% and RET# graphs of the last 10 cycles, press

**F6** **Graph**.

To review the Retic Control files and graphs, see RETIC CONTROL FILE REVIEW in the CONTROLS chapter.

If Retic Control values are out of range, see Table 3, When a Control is Out of Limits.

21. For the next two levels,

    - Select the corresponding Retic Control Run files.

    - Cycle the prepared controls.

## 5C Cell Control for CBC/Diff

5C cell controls have bar-code labels.

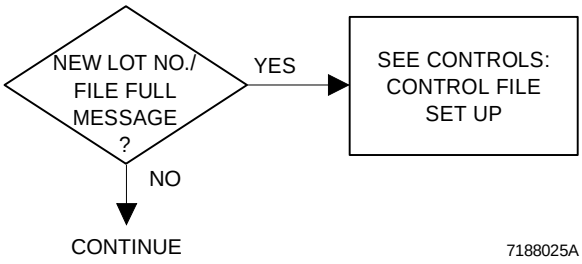
When the bar-code label is read, or when you enter the lot number in the Secondary mode properly, the DMS automatically:

- Identifies the control by level, lot, expiration date and shift.
- Checks control expiration date against current date.
- Stores the data in the proper control file.
- Compares results to expected ranges.
- Flags out-of-range results by H (high) or L (low).
- Displays certain error messages, if they apply, at the bottom of the DMS display.
- Displays the status of the last control run with a QC flag.
- Stops the system when Auto-Stop conditions apply.

Cycle 5C cell control in the CBC/Diff test mode.

### Preliminary Steps

1.




5C cell control is assayed only for the Primary mode. If you use the Secondary mode, your laboratory must determine its own means and expected ranges for each parameter. See Controls chapter.

2. If you want to turn the AutoStop option on, see the Controls chapter.

3. ANALYZER

MAIN

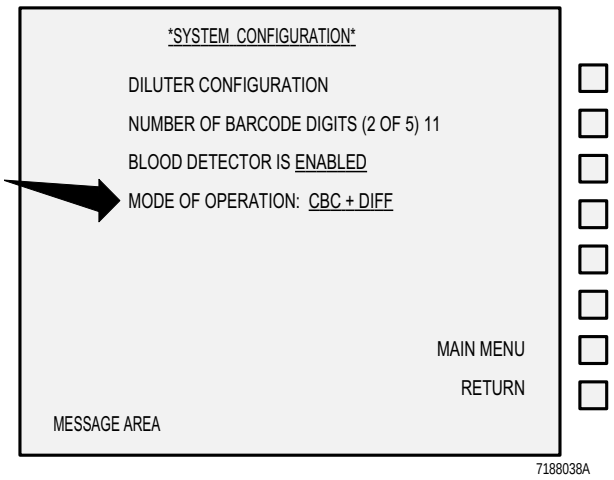
SYSTEM CONFIGURATION

MODE OF OPERATION

Set to CBC + DIFF

MAIN MENU

SYSTEM RUN



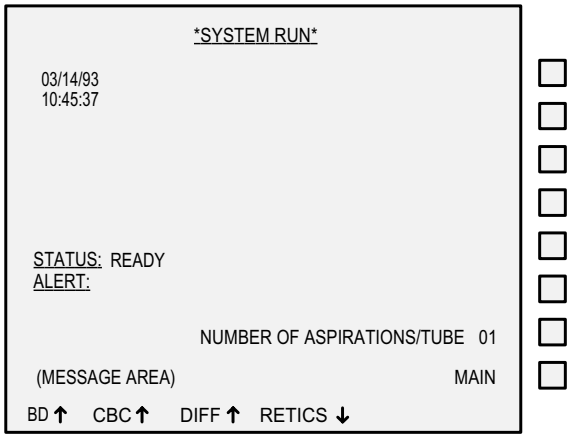
## 5C Cell Control for CBC/DIFF Test in the Primary Mode

1. Check that the number of aspirations is set to 1.

   If not,

   NUMBER OF ASPIRATIONS/TUBE

   DILUTER 1 ENTER



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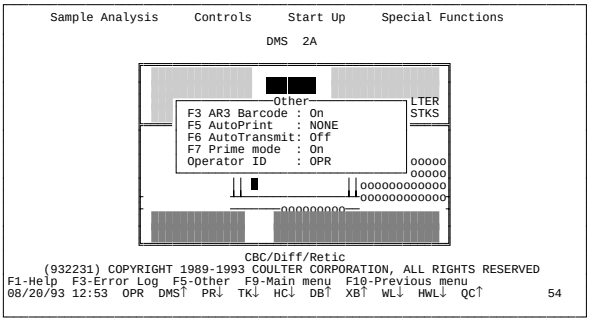
2. DMS At the Main Menu, press

   F5 **Other**.

   F7 **Prime** to turn Prime on.

   Esc.


Sample Analysis Controls Start Up Special Functions
DMS 2A
Other
F3 AR3 Barcode : On
F5 AutoPrint : NONE
F6 AutoTransmit: Off
F7 Prime mode : On
Operator ID : OPR
CBC/Diff/Retic
(932231) COPYRIGHT 1989-1993 COULTER CORPORATION, ALL RIGHTS RESERVED
F1-Help F3-Error Log F5-Other F9-Main menu F10-Previous menu
08/20/93 12:53 OPR DMS↑ PR↓ TK↓ HC↓ DB↑ XB↑ WL↓ HWL↓ QC↑ 54

3. To prime, press

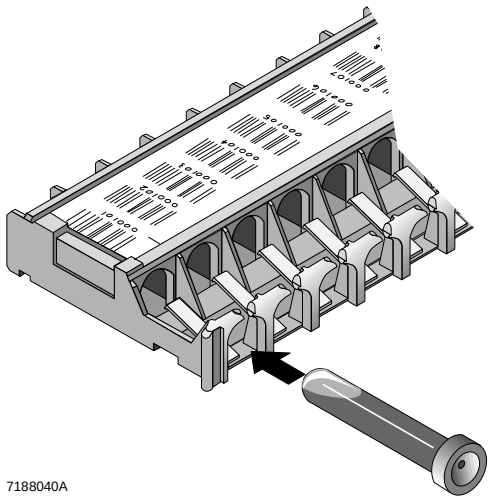
   DILUTER PRIME APERT

4. Cycle a normal whole-blood sample in the Primary mode:

   a. Put a tube in the cassette.

   b. Place the cassette in the right-side loading bay.

   c. DILUTER START/ CONT


7188040A

5. When cycling is complete,

   F5 **Other**.

   F7 to turn Prime off.

   Esc.

---

**IMPORTANT**

**You must properly warm and mix 5C cell control. Follow the procedure on the package insert. To maintain a high read rate, keep the bar-code label free of blood, scratches and powder from gloves.**

---

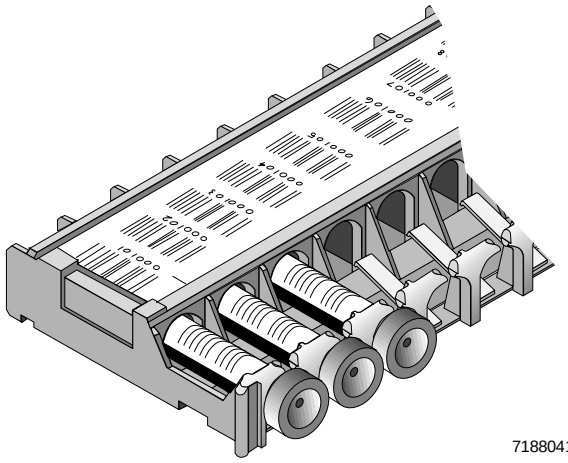
6. Prepare 5C cell controls according to directions in the package insert.

7. Put the control tubes

   - Normal
   - Abnormal I
   - Abnormal II

   in a standard 5 mL cassette with the bar-code labels facing up.

   You can put controls and patient samples in the same cassette.



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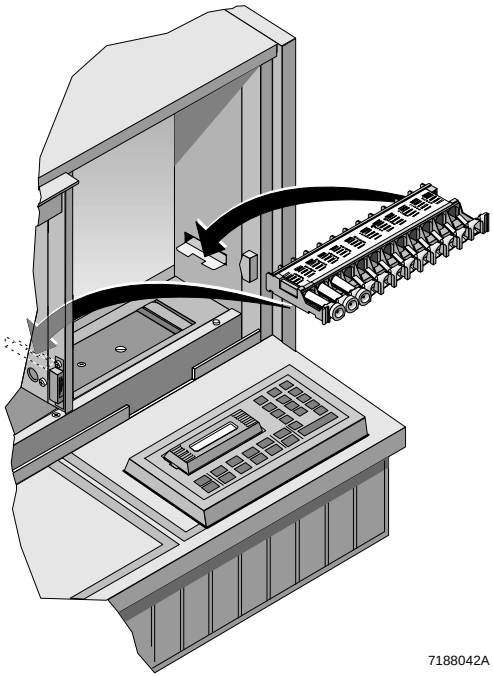
8. Put the cassette in the right-side loading bay.




9. Cycle the controls in the Primary mode:

10. View results on the CBC/DIFF CONTROL RUN screen.

```
                              CBC/DIFF CONTROL RUN
  FILE:   20                      LOT: 884600     OPR: hs      SHIFT : 0
 LEVEL: Normal          EXP DATE: 11/19/93   RUN:  24    10/14/93   09:34

      RESULTS  ASSAY   DIFF  LIMIT            RESULTS   ASSAY   DIFF  LIMIT
 WBC      9.1     9.2   -0.1    0.7   RBC      5.63     5.60   0.03   0.18
                                      HGB     16.6      16.6   -0.0    0.6
 NE%     53.8    53.7    0.1    5.0   HCT     49.2      49.1    0.1    2.7
 NE#      4.9     5.0   -0.1    2.0
                                      MCV     87.3      87.6   -0.3    3.0
 LY%     29.4    29.4    0.0    5.0   MCH     29.5      29.6   -0.1    1.2
 LY#      2.7     2.7    0.0    1.6   MCHC    33.8      33.8    0.0    1.7
                                      RDW     14.1      13.9    0.2    1.5
 MO%      8.8     8.7    0.1    3.0
 MO#      0.8     0.8    0.0    0.8   PLT      230       234     -4     25
                                      MPV     10.6      10.3    0.3    2.0
 EO%      7.8     8.1   -0.3    2.0
 EO#      0.7     0.7    0.0    0.7

 BA%      0.2     0.1    0.1    0.5
 BA#      0.0     0.0    0.0    0.1

F1-Help  F2-File  F4-Print  F6-Graph  F8-Delete  F9-Menu  F12-Graphics
11/15/93 15 01  OPR  DMS↑  PR↓  TK↓  HC↓  DB↑  XB↑  WL↑  HWL↓  QC↓        37  3
```

11. To see WBC, RBC and Hgb graphs of the last 10 cycles, press

Press F6 again to view the other parameter graphs.

12. To review control files and graphs, see CBC/DIFF CONTROL FILE REVIEW in the CONTROLS chapter.

13. If a control is outside limits, the system

    - displays an error message
    - stops if AutoStop is on (status line shows QC↑)
    - turns QC↑ red
    - flags the result with an H or L.

    DMS **Alt** **Esc**

    to clear the error message before you continue.

    Check Table 3 for possible causes of errors.

## 5C Cell Control for CBC/Diff in the Secondary Mode

5C cell control is assayed only for the Primary mode. **If you run it in the Secondary mode, your laboratory must**

- **determine its own means and expected ranges for each parameter, and**
- **set up separate files with separate lot numbers for Secondary mode use.**

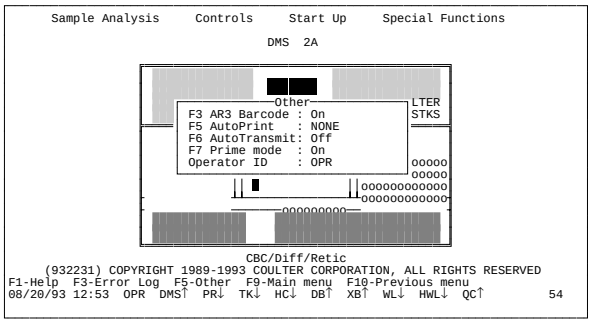
See Control File Set Up in the Controls chapter for entering mean and expected ranges.

1. At the Main Menu press

   DMS **F5** **Other**.

   **F7** **Prime** to turn Prime on.

   **Esc**.



2. Press

3. Enter a three-digit ID number on the Diluter keypad, then press

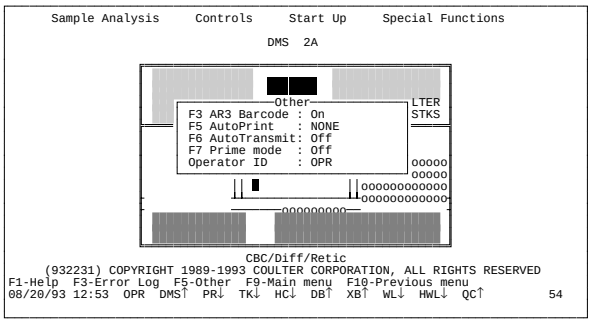
Cycle a normal whole-blood sample.

4. From the Main Menu

**F5 Other**.

**F7 Prime** to turn Prime off.

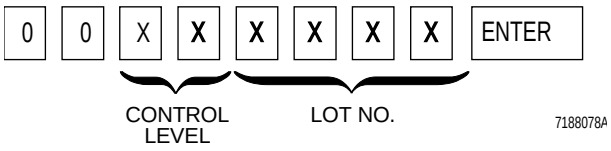
**Esc**.


Sample Analysis
Controls
Start Up
Special Functions
DMS 2A
Other
F3 AR3 Barcode : On
F5 AutoPrint : NONE
F6 AutoTransmit: Off
F7 Prime mode : Off
Operator ID : OPR
CBC/Diff/Retic
(932231) COPYRIGHT 1989-1993 COULTER CORPORATION, ALL RIGHTS RESERVED
F1-Help F3-Error Log F5-Other F9-Main menu F10-Previous menu
08/20/93 12:53 OPR DMS↑ PR↓ TK↓ HC↓ DB↑ XB↑ WL↓ HWL↓ QC↑ 54

5. To enter the ID number:

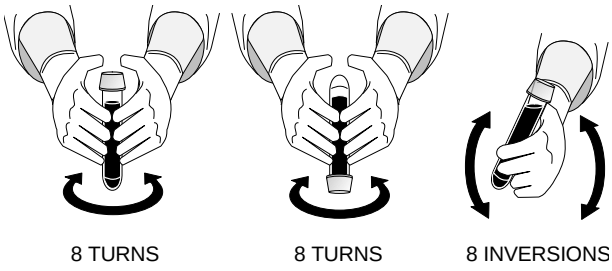
Key in the entire 8-digit bar-code ID number from the label. It is located just below the bar code.

7188043A




7188078A

6. Mix controls gently according to directions in the package insert. Perform the 8/8/8 procedure twice.




7. Cycle the control:

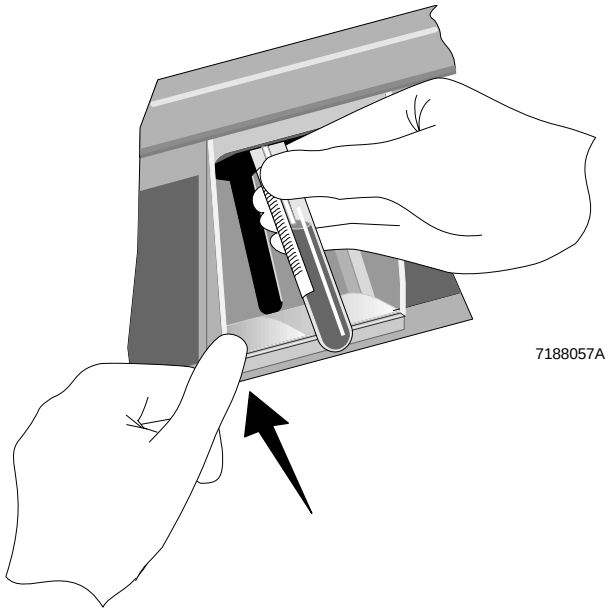
   a. Immerse the aspirator tip in the control vial.

   b. Press and release the activator.

   c. Remove the control when

      - you hear the beep and
      - the Analyzer CRT status field displays *WIPE*.

   d. Wipe the tip with a lint-free tissue.




8. View the results on the CBC/DIFF CONTROL RUN screen. To see WBC, RBC and Hgb graphs of the last 10 cycles, press

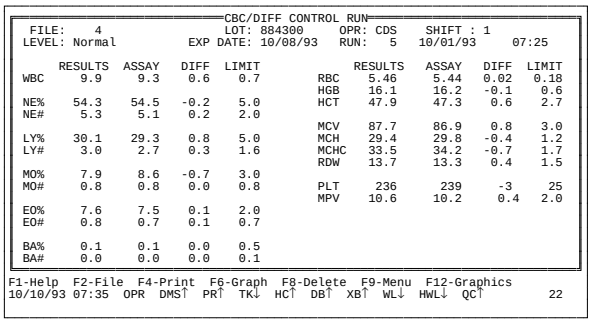
F6.

   Press F6 again to view the other parameter graphs.

9. To review control files, control graphics and graphs, see the Controls chapter.

10. If a control is outside limits, the system

    - stops if AutoStop is on (Status line shows QC↑)
    - turns the QC↑ symbol red
    - displays an error message
    - flags results with H (High) or L (Low).



Alt Esc

clears the error messages before you continue.

Check Table 3 for possible causes of errors.

## 4C® PLUS Cell Control and Commercial CBC-Only Cell Controls

**CAUTION**

**Do not cycle any commercial CBC cell control or calibrator material in the CBC+DIFF or RETIC mode. If you do, it will damage the flow cell.**

1.


   MAIN

   SYSTEM CONFIGURATION

   MODE OF OPERATION

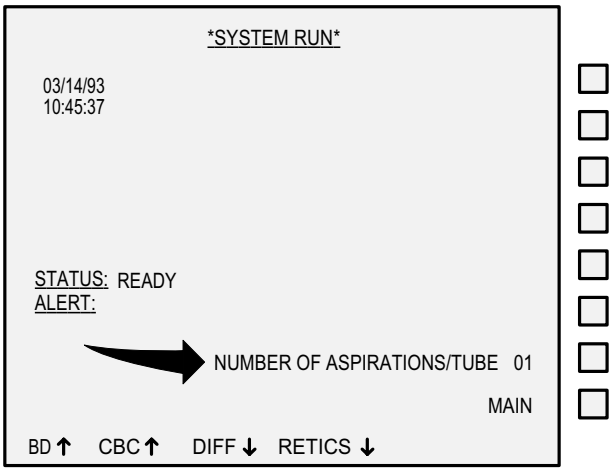
   Press as needed to set to CBC.

   MAIN MENU

SYSTEM RUN

Check that the number of aspirations per tube is set to 1.

To turn the AutoStop option ON, see AutoStop in the CONTROLS chapter.

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2. From the Main Menu, press

**F5** **Other**.

**F7** **Prime** to turn Prime on.

**Esc**.

3. Press

PRIME APERT

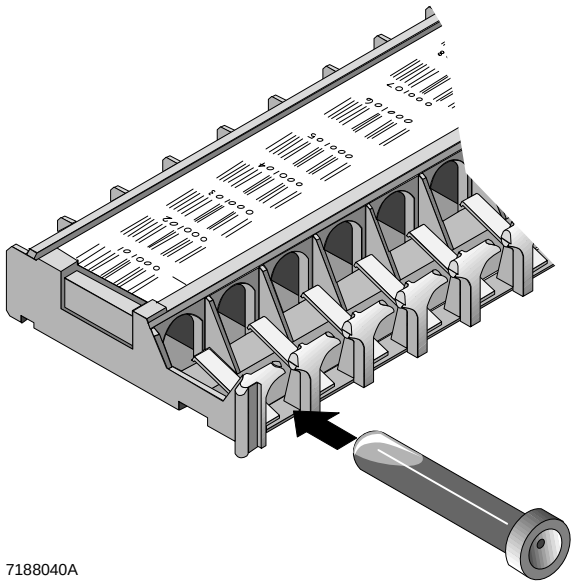
Then cycle a normal whole-blood sample in the Primary mode.

a. Put a tube in the cassette.

b. Place the cassette in the right-side loading bay.

c.


START/ CONT



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4. When the cycle is finished,

   DMS **F5 Other**.

   **F7 Prime** to turn Prime off.

   **Esc**.

5. DMS

   Select

   **Controls**
   **Control Run**

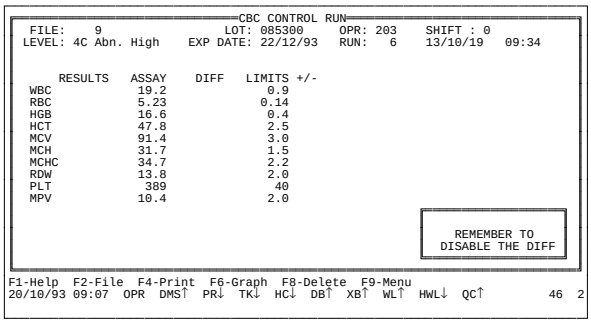
   and press **F2**.

   Select the CBC control file for

   • the level, and

   • the lot number

   you are going to use.




6. Prepare the 4C PLUS cell control (or equivalent) according to directions on the package insert.

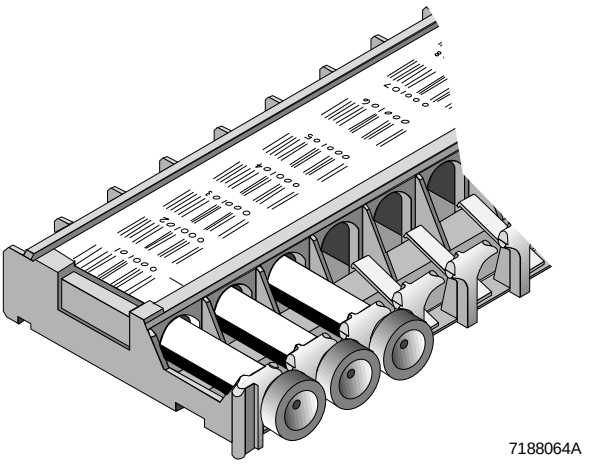
7. Put the control tubes

   • LOW

   • NORMAL

   • HIGH

   preferably in that order from left to right in a cassette.



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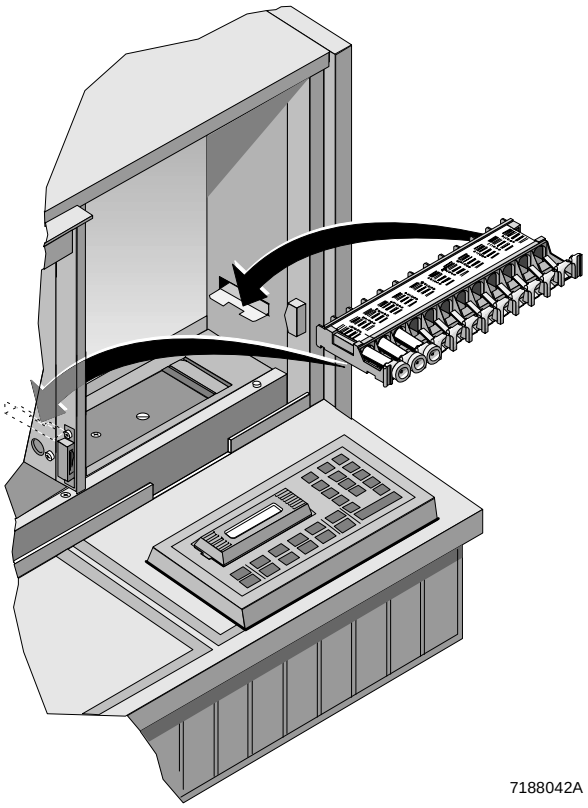
8. Put the cassette in the loading bay.



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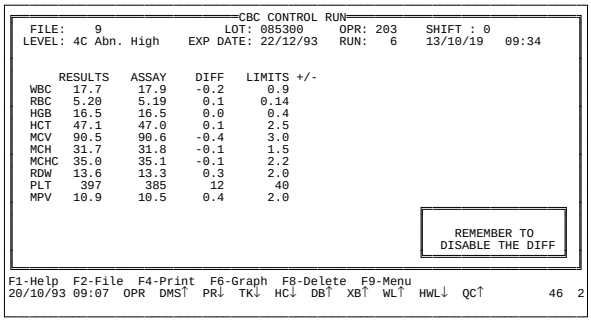
9. DILUTER

START/ CONT

to cycle the control.

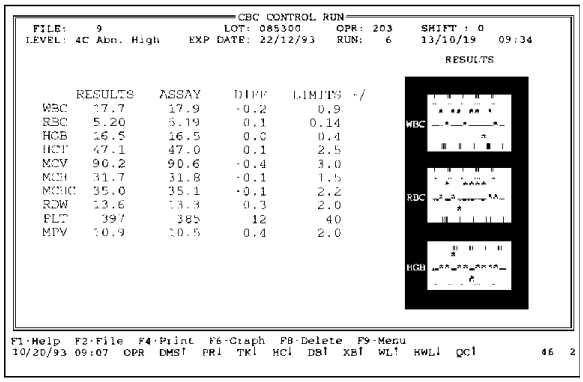

CBC CONTROL RUN
FILE: 9 LOT: 085300 OPR: 203 SHIFT : 0
LEVEL: 4C Abn. High EXP DATE: 22/12/93 RUN: 6 13/10/19 09:34
RESULTS ASSAY DIFF LIMITS +/-
WBC 17.7 17.9 -0.2 0.9
RBC 5.20 5.19 0.1 0.14
HGB 16.5 16.5 0.0 0.4
HCT 47.1 47.0 0.1 2.5
MCV 90.5 90.6 -0.4 3.0
MCH 31.7 31.8 -0.1 1.5
MCHC 35.0 35.1 -0.1 2.2
RDW 13.6 13.3 0.3 2.0
PLT 397 385 12 40
MPV 10.9 10.5 0.4 2.0
REMEMBER TO DISABLE THE DIFF
F1-Help F2-File F4-Print F6-Graph F8-Delete F9-Menu
20/10/93 09:07 OPR DMS↑ PR↓ TK↓ HC↓ DB↑ XB↑ WL↑ HWL↓ QC↑ 46 2

10. To see the WBC, RBC and HGB graphs, press

DMS

F6

Press F6 again to see graphs of other parameters.


CBC CONTROL RUN
FILE: 9 LOT: 085300 OPR: 203 SHIFT : 0
LEVEL: 4C Abn. High EXP DATE: 22/12/93 RUN: 6 13/10/19 09:34
RESULTS
RESULTS ASSAY DIFF LIMITS +/-
WBC 17.7 17.9 -0.2 0.9
RBC 5.20 5.19 0.1 0.14
HGB 16.5 16.5 0.0 0.4
HCT 47.1 47.0 0.1 2.5
MCV 90.5 90.6 -0.4 3.0
MCH 31.7 31.8 -0.1 1.5
MCHC 35.0 35.1 -0.1 2.2
RDW 13.6 13.3 0.3 2.0
PLT 397 385 12 40
MPV 10.9 10.5 0.4 2.0
WBC
RBC
HGB
F1-Help F2-File F4-Print F6-Graph F8-Delete F9-Menu
20/10/93 09:07 OPR DMS↑ PR↓ TK↓ HC↓ DB↑ XB↑ WL↑ HWL↓ QC↑ 46 2

7188090A

11. DMS

    As soon as the screen displays results for the LOW control, change the Control Run file to the NORMAL for the lot number you are using.

    Press F2 and select.

    Repeat the selecting and cycling procedure for HIGH.

12. To review control files and graphs, see CBC CONTROL FILE REVIEW in the CONTROLS chapter.

13. If the control is outside limits, the system

    - displays an error message
    - stops if AutoStop is on (status line shows QC↑)
    - turns QC↑ red
    - flags the result with an H or L.

    DMS Alt Esc

    to clear the error message before you continue.

    Check Table 3 for possible causes of errors.

See the CONTROLS chapter for these related topics:

- AutoStop Option
- Control Management by Shift
- Error Messages for Controls
- Control Run Matrix

- IQAP ID Set Up
- QC Status
- $\overline{X}_B$ Analysis

See Appendix C for the Differential Comparison Procedure.

**Table 3 When A Control is Out of Limits**

| Possibility | Action |
|---|---|
| Wrong control file | CBC<br><br>Check that you are in the correct file and that correct values are entered in your control file data base. If file was incorrect, use F8 from the Control Run screen to delete last sample and rerun the control in the proper file. |
| | CBC/Diff and Retic<br><br>1. The bar-code label was not read. Check the label for cleanliness and correct position in the cassette. Rerun.<br><br>2. The control identification was entered incorrectly on the Diluter keypad. Follow the directions in these procedures and enter the ID correctly. Rerun. |
| Control file set up incorrectly | Verify that the assigned values and ranges match those on the control's package insert. If in error, correct them in DMS **Special Functions/ Control Set Up.** |
| Chance (statistical outlier) | Rerun the control. If it is still "out," try the next possibility. |
| Incorrect Retic control preparation | Verify correct preparation procedure. Prepare and run another control sample. |
| Change in the control | Try another vial or level of control. Be sure to use the correct control file. Follow directions on the package insert for proper handling. |
| Instrument change | Watch for normal sample flow. Call Coulter Customer Operations to help you troubleshoot abnormal operation. |

# MODES OF OPERATION

## Sample Modes (Diluter Aspiration)

Sample mode determines which Diluter aspiration method is used.

### Primary Mode

- Closed vial
- Automated
- Requires 250 µL of whole blood for a complete CBC or CBC with WBC differential. There must be a minimum of 1 mL of sample with the proper proportion of blood to anticoagulant in the tube.

### Secondary Mode

- Open vial
- Requires only 150 µL of whole blood for a complete CBC or CBC with WBC differential.
- Use for samples with very low hemoglobin results when Primary mode run produces a partial aspiration. (Blood detectors do not recognize these samples as blood.)
- Use for Reticulocyte samples. Aspirates approximately 2 mL of prepared Retic sample. 50 µL of whole blood required to prepare the sample.
- Use for LATRON control and primer, with specific Diluter functions per Test mode.

## Test Modes (Analyzer Configurations)

Test mode, set at the Analyzer CRT, determines how the data is processed by the STKS.

### CBC Mode

Performs basic CBC on whole-blood samples, in either Primary or Secondary mode.

### CBC/Diff Mode

Performs CBC and WBC differential on whole blood samples, in either Primary or Secondary mode.

### Retics Mode

Analyzes prepared Reticulocyte samples in the Secondary mode only.

## WORKFLOW

The STKS with Reticulocyte analysis capability accommodates a variety of workflow patterns based on whether or not you elect to preassign samples in the Worklist.

You have the option of combining results from the CBC/Diff and Retic test modes on a single collated report.

Use the Worklist to preassign samples by test. The Worklist is organized by test type: CBC, CBC/Diff, and Retic. A test or combination of tests for a single patient specimen is a profile. Profiles are for collating purposes. Each profile has a number. Default profiles are:

| Profile Number | Test(s) |
|---|---|
| 1 | CBC/Diff |
| 2 | CBC |
| 3 | CBC/Diff + Retic |
| 4 | Retic |

For the STKS with Reticulocyte analysis, there are five basic workflow scenarios. They are:

1. No preassignment. Worklist not used.
2. Preassign but no collating.
3. Preassign both tests: CBC/Diff and Retics. Results will be collated automatically.
4. Assign the second test to the Worklist after the first is performed. Results will be collated.
5. Edit one test to the other after both are done.

The following flowchart illustrates these scenarios. Table 4 describes these scenarios, tells you what to do in each case, and lists the benefits of each.

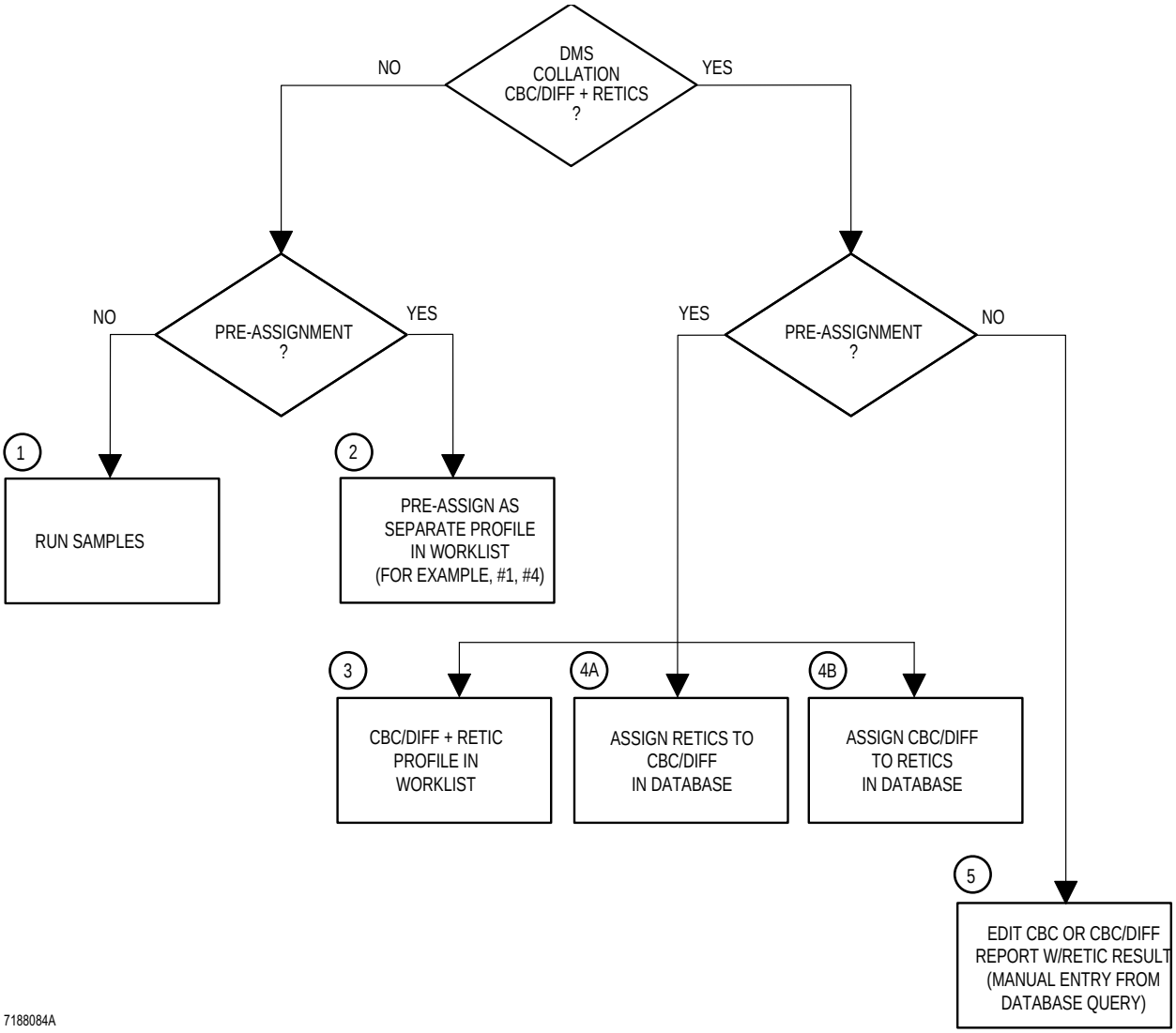



**Table 4 STKS with Retic Analysis Workflow Scenarios**

| Scenario | What to do | Benefits |
|---|---|---|
| **1. No DMS Collation, No Preassignment** | | |
| • Retics, CBC/Diff and CBC are run and reported independently.<br><br>• Retic reports only RET% (RBC count can be added to the report for auto-calculation of RET#). | Set Analyzer to desired test mode.<br><br>**Prime Aperture**.<br><br>Analyze prime sample.<br><br>Identify and run your sample(s). | 1. Simplest method, good for individual retics or very small batches.<br><br>2. Useful if host collates. |

*continued*

**Table 4 STKS with Retic Analysis Workflow Scenarios**

| Scenario | What to do | Benefits |
|---|---|---|
| *continued* | | |
| **2. Preassignment, No Collation** | | |
| • Assign Retic Only, CBC Only or CBC/Diff Only test profile; results kept separate.<br>• Retic reports RET% only (RBC count can be added to the report for auto-calculation of RET#). | a. Access Worklist **F2** **Add**.<br>b. Enter profile # for Retic, CBC or CBC/Diff.<br>c. Analyze samples as in Scenario 1. | 1. Printable Worklist helps organize batches of tests.<br>2. Provides additional safety measure for proper sample ID. |
| **3. Preassign CBC/Diff and Retic before <u>both</u> tests performed** | | |
| • CBC/Diff + Retic ordered as a single test Profile, both results appear on single report.<br>• Reports RET% and RET#. | a. Access Worklist **F2** **Add**.<br>b. Select CBC Diff/Retic profile #.<br>c. Assign patient ID for each test; add demographics as desired. **PgDn** for next sample.<br>d. Analyze samples as in Scenario 1. | Useful if lab is currently preassigning (manually or by host) and collation at DMS is desired. |
| **4-A. Assign Retic to CBC/Diff existing in Data Base** | | |
| • Retics test request is added to existing CBC/Diff data. Retic sample is run, and a new single report is generated with both CBC/Diff and Retics results.<br>• Retics are reported as RET% and RET#. | a. Run CBC/Diff.<br>b. Select sample from DataBase (DB).<br>c. Access Edit demog./Profile screen **Alt** **F3**.<br>• Request CBC Diff/Retic profile #<br>• Assign patient Retic ID number.<br>• Test request appears on Retic Worklist.<br>d. Analyze Retic samples as in Scenario 1. | 1. Collation benefits.<br>2. Demographics on lab report.<br>3. Maintains walkaway CBC/Diff workflow. |
| | | *continued* |

**Table 4 STKS with Retic Analysis Workflow Scenarios**

| Scenario | What to do | Benefits |
|---|---|---|
| *continued* | | |
| **4-B. Assign CBC/Diff to Retic existing in Data Base** | | |
| • CBC/Diff test request is added to existing Retic data. CBC/Diff sample is run, and a new single report is generated with both CBC/Diff and Retics results.<br>• Retics are reported as RET% and RET#. | a. Run Retic.<br>b. Select sample from Data Base (DB).<br>c. Access Edit demog./Profile screen Alt F3.<br>• Request CBC Diff/Retic profile #<br>• Assign patient CBC/Diff ID number.<br>• Test request appears on CBC/Diff Worklist.<br>d. Analyze CBC/Diff samples as in Scenario 1. | 1. Collation benefits.<br>2. Demographics on lab report.<br>3. Maintains walkaway CBC/Diff workflow. |
| **5. Manual Collation by Editing Retic to CBC or CBC/Diff Report** | | |
| • Manually add Retic result to CBC or CBC/Diff in DataBase after both tests performed. | a. Select sample in DataBase.<br>b. F3 to go to Edit screen.<br>c. Add RET% (system will calculate RET#). | Used for adding manual Retic to CBC or CBC/Diff. |

## COLLECTING SPECIMENS

Collect whole blood in a salt of EDTA according to tube manufacturer's instructions and procedures in:[1,2,3]

- NCCLS publication H4-A3 (for capillary) or
- NCCLS publication H3-A3 (for venipuncture).[4,5]

Coulter recommends that you use $K_3$EDTA as Coulter used $K_3$EDTA in collecting data and verifying claims.

See Appendix D for additional tube sizes and styles in the Primary mode.

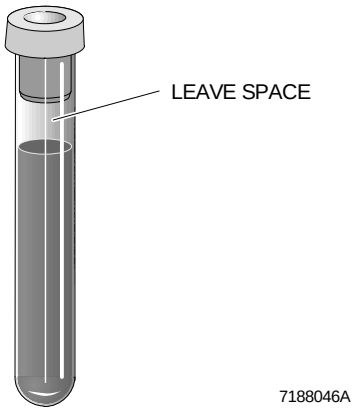
You need

Primary mode:

- minimum of 1.0 mL sample with proper proportion of blood to anticoagulant.
- approximately 250 µL of whole blood is aspirated.

Secondary mode:

- 150 µL whole blood is aspirated.
- 50 µL whole blood for Retic preparation.



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**IMPORTANT**

**Be sure there is a bubble (or space) in each sample tube to facilitate mixing.**

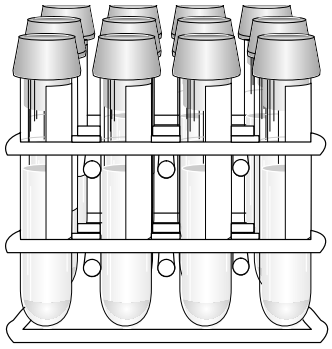
---

## STORING SPECIMENS

1. Venipuncture specimens.

   For CBC and DIFF

   - Run within 24 hours of drawing.
   - Store capped at room temperature.
   - For optimum accuracy, analyze as soon as possible.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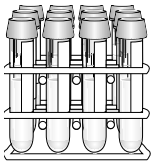
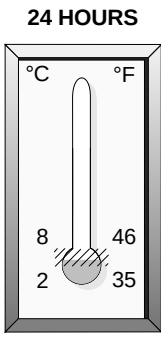
For Reticulocytes

- Run within 8 hours if you store the sample at room temperature.
- Run within 24 hours if you store the sample at 2 to 8°C (35 to 46°F).



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2. Capillary specimens.

   Follow the manufacturer's recommendations for the microcollection device.

For more information on handling and processing blood specimens, refer to NCCLS publication H18-A.

## PRIMING: WHEN TO PRIME

Prime the system by pressing PRIME APERT on the Diluter and cycling a

- normal whole-blood sample for CBC or CBC + DIFF, or
- prepared reticulocyte sample for RETICS

when

- you change from Primary to Secondary mode or from Secondary to Primary,
- you change from any test configuration (CBC, CBC + DIFF, RETICS) to another,
- the pneumatics have timed out.

Prime the system in the mode in which you intend to cycle the samples.

Priming in the Primary and Secondary modes is described under the heading CYCLING SAMPLES.

## BAR-CODE LABELS

The recommended operation of this system requires the use of bar-code labels for specimen identification in the Primary (cap-piercing) mode, and on the AUTO-REPORTER 3 report form. The labels are identification numbers, and can be up to 11 digits for Interleaved 2-of-5. The bar-code labels used with this system must meet the Coulter specifications in your Reference manual, PN 4237182. It is important to affix the labels carefully so that the scanner reads them correctly.

To print bar-code labels on the Intermec® printer, select

**Sample Analysis**
**Barcode Label**

Press F1 **Help** for detailed information.

### Rule for Interleaved 2-of-5

When you use Interleaved 2-of-5 bar-code labels, all labels must have the same number of digits. This number is set on the Analyzer CRT in SYSTEM CONFIGURATION. You cannot mix the number of digits stored in the DMS data base. If you do, this message appears on the DMS:

*ONLY XX NUMBER DIGITS FOR I20F5 CAN BE STORED IN DATA BASE*

where XX equals the number of digits of the first Interleaved 2-of-5 sample received by the DMS from the Analyzer.

If this occurs, the DMS does not receive any more samples, and you lose the results of the sample that caused the message. If the Analyzer continues to send sample data, at the next sample, the Analyzer stops and displays this message:

*Check DMS Status*

You must reset the Analyzer, then label the sample with the same number of digits as all others in the data base and rerun it.

If you want to use labels with a different number of digits, you must first delete the entire data base, then set desired number of digits on the Analyzer CRT.

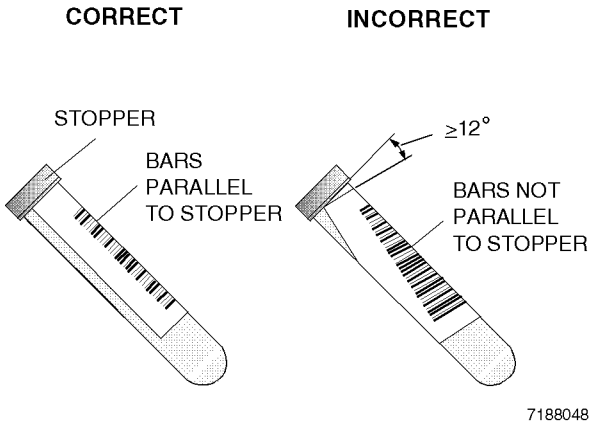
# PLACING BAR-CODE LABELS

## Sample Tubes

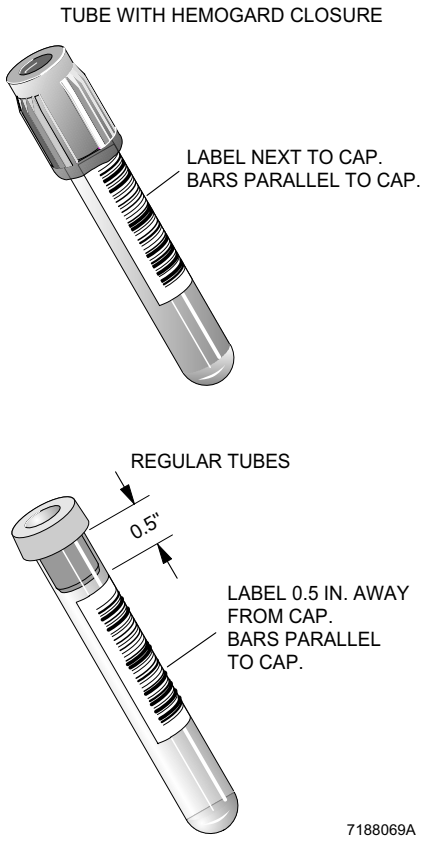
**IMPORTANT**

**Place the label as instructed so the scanner can read it correctly.**

1. Place the label at the top of the tube, next to the stopper.
2. Place end of label flush with stopper.
3. Press label down securely, including edges and corners.
4. The bars on the label must be parallel to the stopper.




When your system is modified for tubes with HEMOGARD™ Closure, labels on regular tubes must be placed 0.5 in. down from the cap. Position a bar-code label on tubes with HEMOGARD Closure, and on the regular tubes with a modified system, as illustrated.

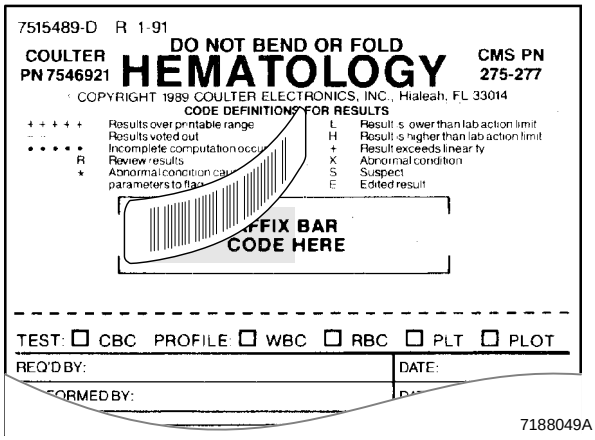


## Printout Ticket (Auto-Reporter 3)

Place the bar-code label securely within the outline on the ticket.

**CAUTION**

**Be sure that no label is placed along the sides of the ticket. This area feeds through rollers that do not accommodate the additional thickness.**




# CYCLING SAMPLES

**WARNING**

**If a problem occurs while the system is cycling, press** DILUTER STOP **and wait for the system to stop before you do anything to correct the problem.**

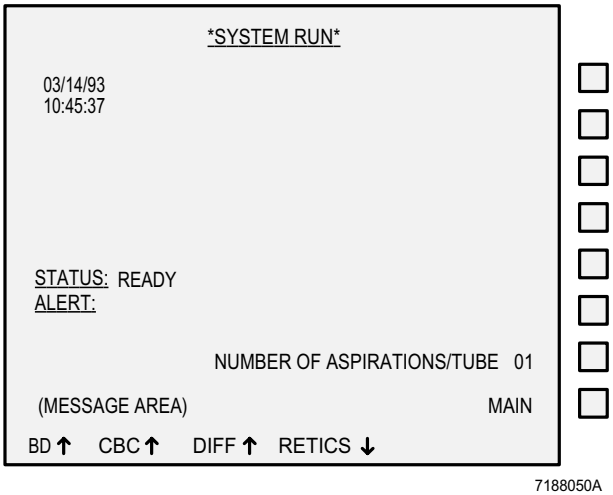
## Primary Mode: CBC, CBC + DIFF

1. ANALYZER Check for

   - STATUS: READY
   - ALERT: (is blank)
   - BD↑

   If BD↓,

   MAIN



SYSTEM CONFIGURATION

BLOOD DETECTOR

MAIN MENU

SYSTEM RUN

- CBC↑ or

  CBC↑ and DIFF↑

  If you need to change mode:

  MAIN

  SYSTEM CONFIGURATION

  MODE OF OPERATION
  Press the key as needed to set test mode.

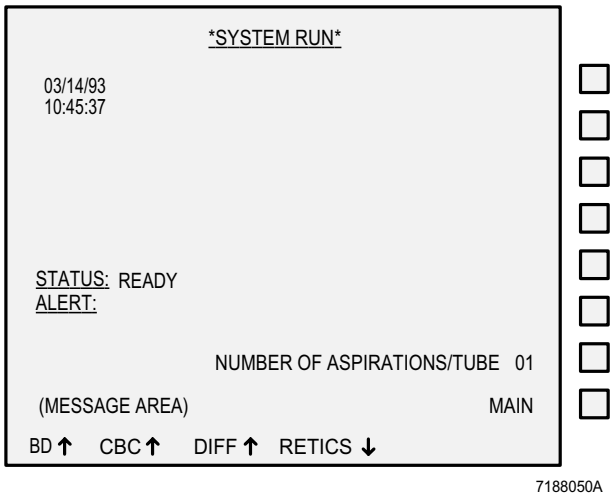
  MAIN MENU

  SYSTEM RUN

- NO. OF ASPIRATIONS/TUBE 01

  If it is more,

  NO. OF ASPIRATIONS/TUBE

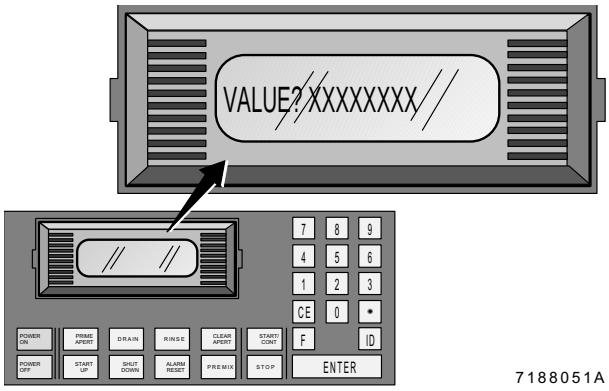


**CAUTION**

**Do not pierce a specimen tube more than five times. Additional piercing can clog the needle.**

A *VALUE?* message appears on the Diluter keypad.

DILUTER | 1 | ENTER

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2. Prime the instrument:

   a. DILUTER | PRIME APERT

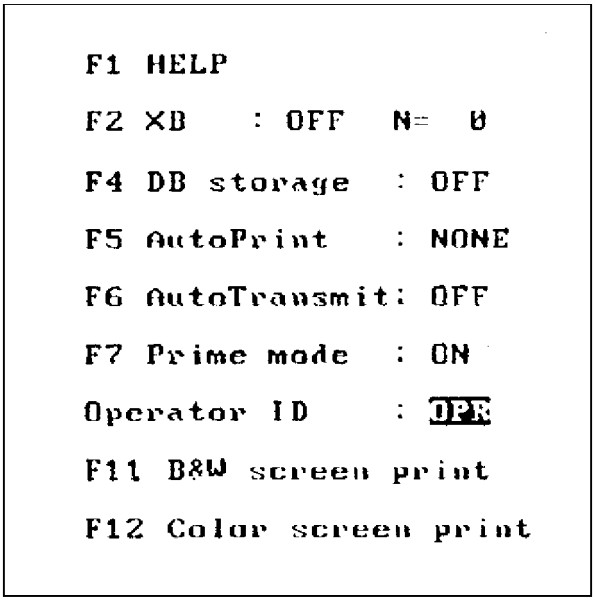
   b. DMS Select

   **Sample Analysis**
   **Run Samples**

   **F5 Other**.

   **F7 Prime** to turn Prime on.

   **Esc**.


F1 HELP
F2 XB : OFF N= 0
F4 DB storage : OFF
F5 AutoPrint : NONE
F6 AutoTransmit: OFF
F7 Prime mode : ON
Operator ID : OPR
F11 B&W screen print
F12 Color screen print

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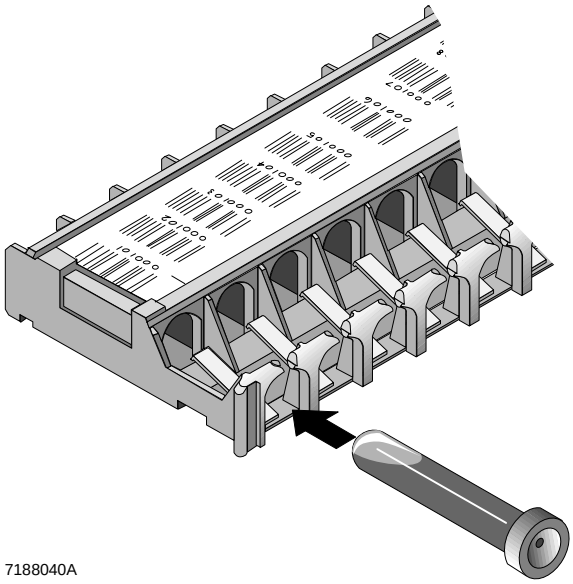
c. Slide the normal whole-blood sample into a cassette.

d. Put the cassette into the loading bay on the right side of the instrument.



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e. DILUTER START/ CONT

f. When cycling is completed

DMS **F5** **Other**.

**F7** **Prime** to turn Prime off.

g. Check that all the F5 Options are correct.

**Esc**

3. If you want to preassign samples on the Worklist, do so now.

See Worklist chapter.

```
                                  Worklist
 Current line     1              Entries    7/    7                Tagged    0
                                 < CBC/DIFF >
 Cass/pos  ID# 1                 ID# 2                Sequence #  Tests      Status

  001209  0825001                Jones, Sam                       CDR
  001210  0825002                Miller, Betty                    CD
  001211  0825003                Monroe, James                    CD
  001212  0825004                Arthur, Sally                    CD
  001301  0825005                Daniels, Lynn                    CDR
  001302  0825006                Harper, Charles                  CDR
  001303  0825007                Morgan, Anne                     CDR

F1-Help F2-Add F3-Edit F4-Print F5-Seq F6-Del F7-Tag F11-HWL F12-DBQ ↔Next test
08/25/93 09 14  OPR  DMS↑  PR↓  TK↓  HC↓  DB↑  XB↑  WL↓  HWL↓  QC↑          46
```

4. Load the cassettes.

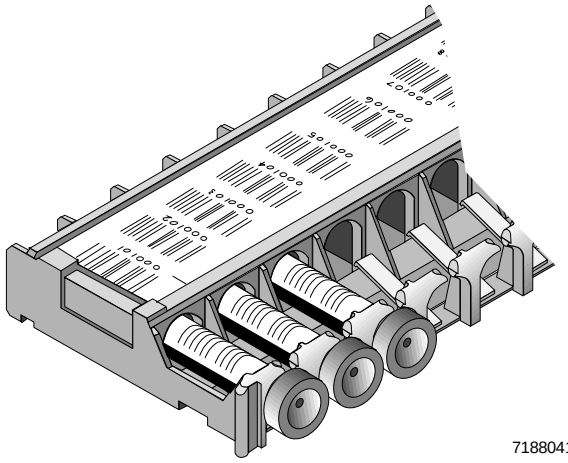
**IMPORTANT**

**If not using bar-code labels on the sample tubes, it is your responsibility to place the tubes in the proper cassette positions.**

The recommended operation of this system requires the use of bar-code labels for specimen identification in the Primary (cap-piercing) mode.

Each cassette has a bar-code label that identifies the cassette and each position in it. This gives you sample traceability, but it does not positively identify the sample.

- Slide the tubes in firmly.
- Be sure the bar-code labels are facing up.



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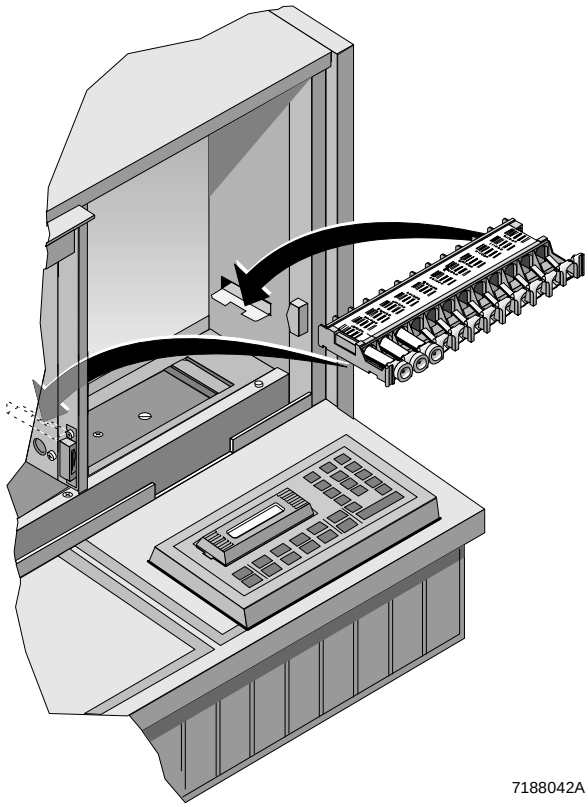
5. Put the cassettes firmly and securely into the loading bay.

You can place up to 12 tubes in a cassette, and up to 12 cassettes in the loading bay on the right side.

If your system is modified for tube with HEMOGARD closure, see Appendix B.



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6. Check for

ANALYZER

- STATUS: READY
- ALERT: (blank)

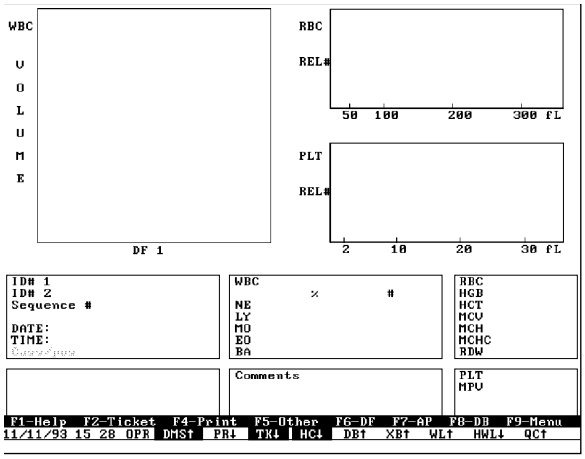
DMS

- Sample Run screen

7. DILUTER

START/ CONT

8. Verify all sample ID numbers before you report results.

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## Secondary Mode: CBC, CBC + DIFF

Use the Secondary mode for manual aspiration. Bar-code labels are not read in this mode; you must enter an ID number via the Diluter keypad before cycling the sample. You can use only number characters to identify Secondary mode specimens.

---

**IMPORTANT**

**Blood detectors are inactive in the Secondary mode. Inspect specimens for clots and use good laboratory practice for verifying results.**

---

1. ANALYZER Check for

   - STATUS: READY
   - ALERT: (is blank)
   - CBC↑ or

     CBC↑ and DIFF↑

   If you need to change mode:

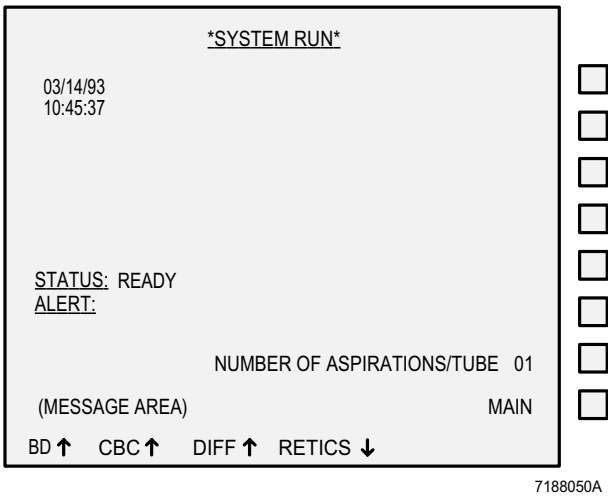
   MAIN

   SYSTEM CONFIGURATION

   MODE OF OPERATION
   Press the key as needed to set test mode.

   MAIN MENU

   SYSTEM RUN

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2. Prime the instrument:

   a. DILUTER PRIME APERT

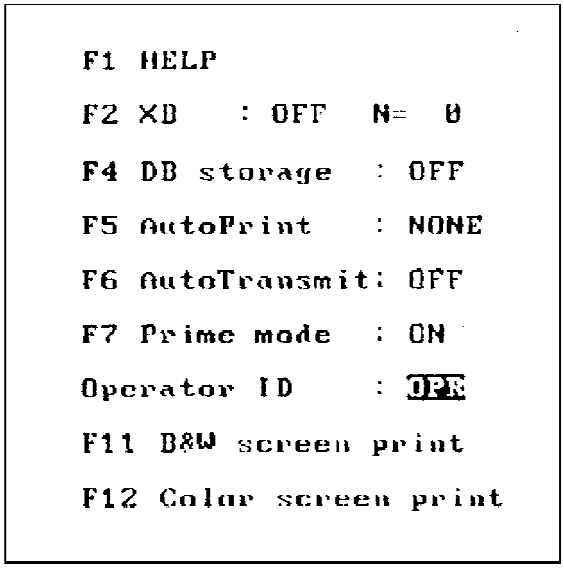
   b. DMS Select

   **Sample Analysis**
   **Run Samples**

   F5 **Other**.

   F7 **Prime** to turn Prime on.

   Esc.


F1 HELP
F2 XB : OFF N= 0
F4 DB storage : OFF
F5 AutoPrint : NONE
F6 AutoTransmit: OFF
F7 Prime mode : ON
Operator ID : OPR
F11 B&W screen print
F12 Color screen print

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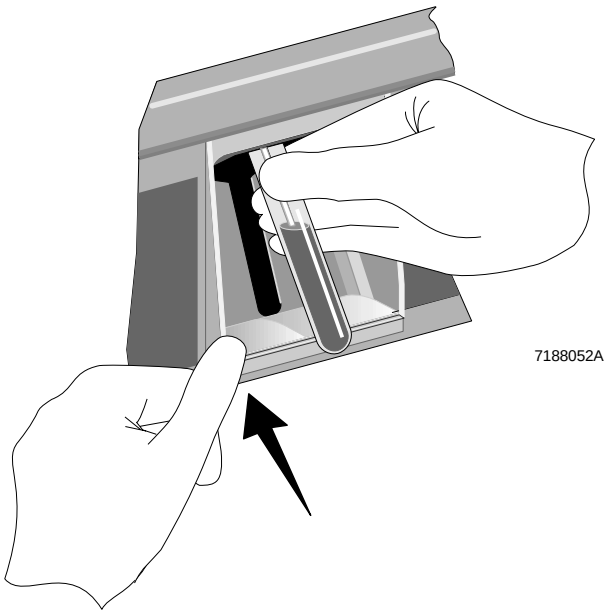
c. DILUTER | ID

Enter 3 - 11 digits.

| 1 | 1 | 1 | ENTER |
|---|---|---|---|

d. Immerse the aspirator tip in the sample tube.

e. Press and release the activator.




**IMPORTANT**

**Do not remove the sample tube from the aspirator tip until the STATUS message on the Analyzer CRT changes from *INTRO SAMPLE* to *WIPE*, and there is a beep.**

**WARNING**

**The aspirator tip retracts when the *PRIME* message appears in the STATUS field on the Analyzer CRT; be sure to remove the sample tube and be clear of the aspirator tip before the *PRIME* message appears.**

f. Remove the tube when

- you hear the beep and
- the Analyzer CRT STATUS field displays *WIPE*.

g. Wipe the tip with a lint-free tissue.

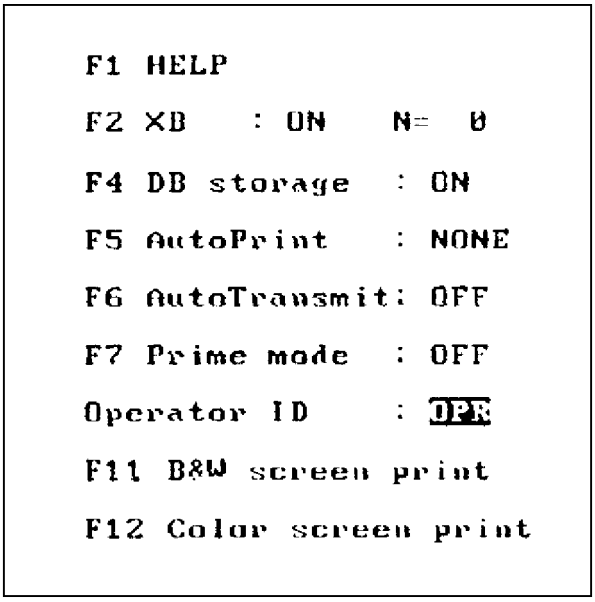
h. When cycling is completed

F5 **Other**

F7 **Prime** to turn Prime off.

i. Check that all the F5 Options are correct for your laboratory.

Esc


F1 HELP
F2 XB : ON N= 0
F4 DB storage : ON
F5 AutoPrint : NONE
F6 AutoTransmit: OFF
F7 Prime mode : OFF
Operator ID : OPR
F11 B&W screen print
F12 Color screen print

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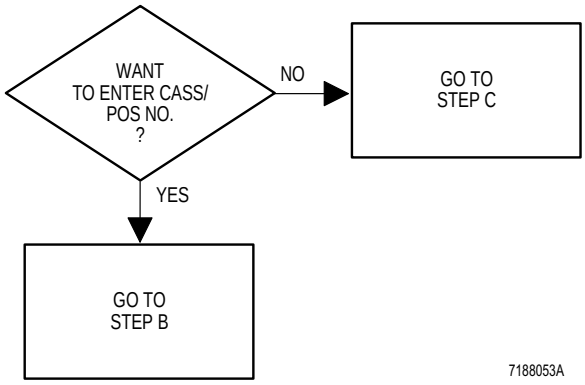
3. To enter the sample ID number:

a.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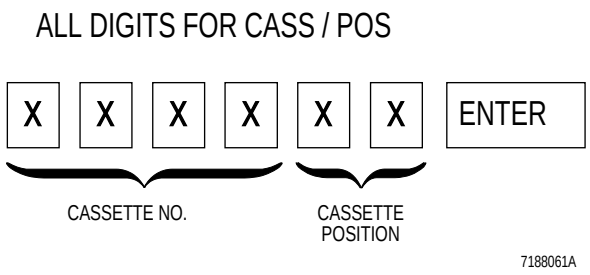
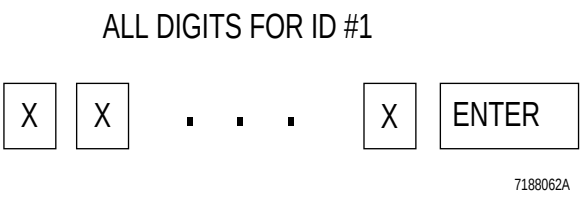
b. F

then enter a 6-digit Cass/Pos number.




c. Enter a 3-11 digit ID#1 for the patient sample.

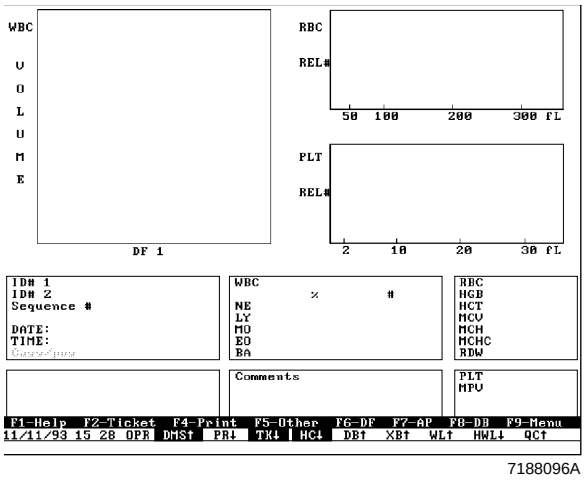



d. ANALYZER

Check the numbers on the Analyzer CRT to be sure they are correct.

e. DMS

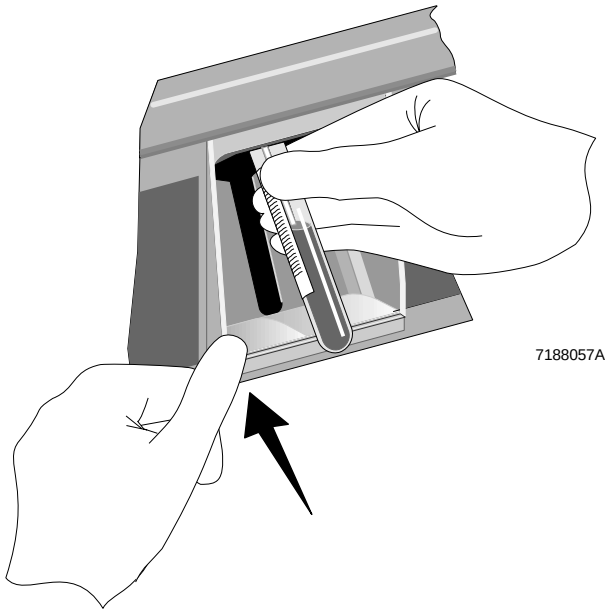
Check that the DMS displays the Run Samples screen.



4. Cycle the sample:

   a. Immerse the aspirator tip in the sample tube.

   b. Press and release the activator.




**IMPORTANT**

**Do not remove the tube from the aspirator tip until the STATUS message on the Analyzer CRT changes from *INTRO SAMPLE* to *WIPE*, and there is a beep.**

**WARNING**

**Be sure to remove the sample tube and be clear of the area around the aspirator tip before the STATUS field displays the *PRIME* message.**

   c. Remove the tube of primer when

      - you hear the beep and
      - the Analyzer CRT STATUS field displays *WIPE*.

   d. Wipe the tip with a lint-free tissue.

5. Verify sample ID numbers before you report results.

## Secondary Mode: Reticulocytes

**IMPORTANT**

**Perform the reticulocyte dilution method according to the instructions in the package insert and below. Modifications to the procedure, or failure to follow these instructions, may lead to misleading or erroneous results.**

Prepare the sample using the COULTER ReticPrep reagent kit.

1. ANALYZER

   Set the MODE OF OPERATION to RETICS so that

   CBC↓ DIFF↓ RETICS↑.

   MAIN

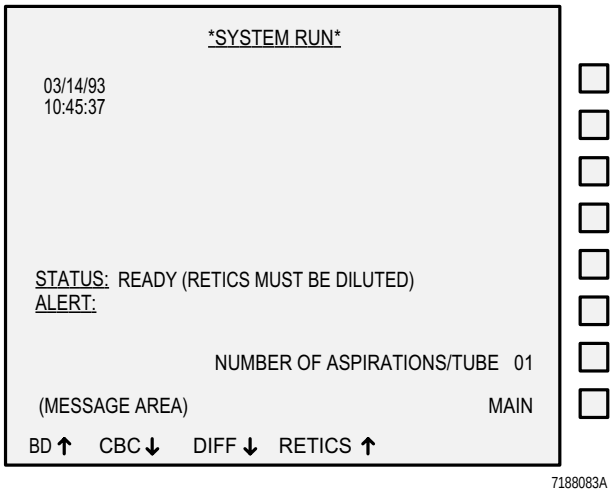
   SYSTEM CONFIGURATION

   MODE OF OPERATION
   Press the key opposite the test configuration to set to RETICS.

   MAIN MENU

   or

   RETURN

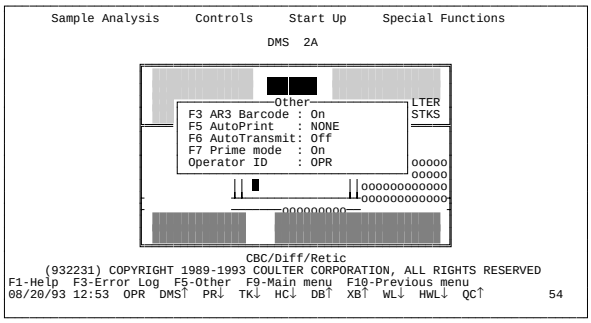


2. DMS At the Main Menu, press

   **F5** **Other**.

   **F7** **Prime** to turn Prime on.

   **Esc**.


Sample Analysis Controls Start Up Special Functions
DMS 2A
Other
F3 AR3 Barcode : On
F5 AutoPrint : NONE
F6 AutoTransmit: Off
F7 Prime mode : On
Operator ID : OPR
LTER
STKS
CBC/Diff/Retic
(932231) COPYRIGHT 1989-1993 COULTER CORPORATION, ALL RIGHTS RESERVED
F1-Help F3-Error Log F5-Other F9-Main menu F10-Previous menu
08/20/93 12:53 OPR DMS↑ PR↓ TK↓ HC↓ DB↑ XB↑ WL↓ HWL↓ QC↑ 54

3. Press

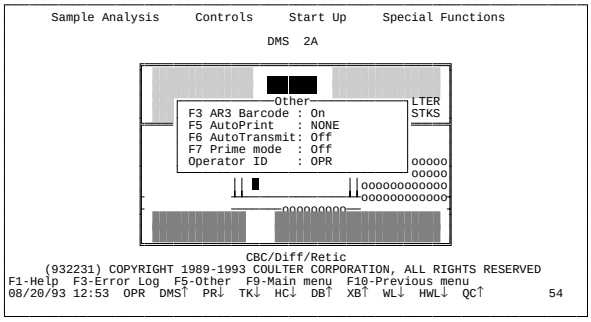
   DILUTER [PRIME APERT]

4. Cycle a prepared reticulocyte sample as a prime.

5. DMS **F5** **Other**.

   **F7** **Prime** to turn Prime off.

   **Esc**.


Sample Analysis Controls Start Up Special Functions
DMS 2A
Other
F3 AR3 Barcode : On
F5 AutoPrint : NONE
F6 AutoTransmit: Off
F7 Prime mode : Off
Operator ID : OPR
LTER
STKS
CBC/Diff/Retic
(932231) COPYRIGHT 1989-1993 COULTER CORPORATION, ALL RIGHTS RESERVED
F1-Help F3-Error Log F5-Other F9-Main menu F10-Previous menu
08/20/93 12:53 OPR DMS↑ PR↓ TK↓ HC↓ DB↑ XB↑ WL↓ HWL↓ QC↑ 54

6. DMS Select

   **Sample Analysis**
   **Run Samples**

7. Enter the sample ID number.

   a. DILUTER [ID]

      Enter a 3-11 digit ID#1 for the patient sample.

ALL DIGITS FOR ID #1

[X] [X] . . . [X] [ENTER]

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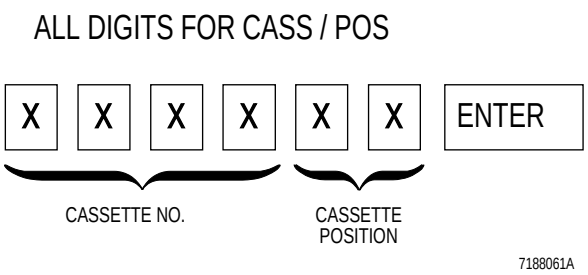
OR

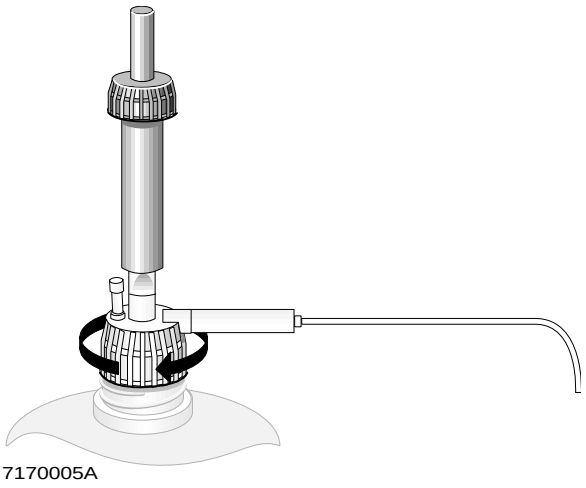
b.


and enter a 6-digit Cass/Pos number.

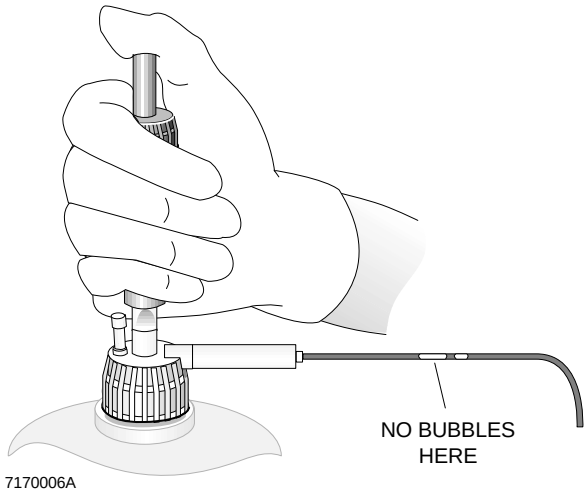



c. Check the numbers on the Analyzer CRT to see if they are correct.

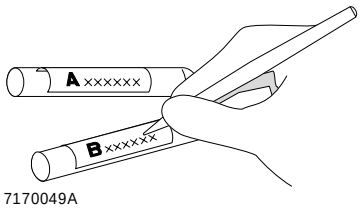
8. Make sure the repipetter is fitted securely to the Reagent B bottle.




9. Prime Reagent B, making sure Reagent B fills the clear tubing of the repipetter.



10. Label two glass test tubes for each patient sample: one for Reagent A and one for Reagent B.



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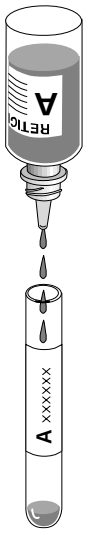
**IMPORTANT**

**Dispensing reagent at an angle changes the dilution of the preparation.**

11. Holding the dropper bottle vertically, place 4 drops of Reagent A into the "A" tube.



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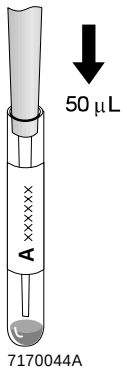
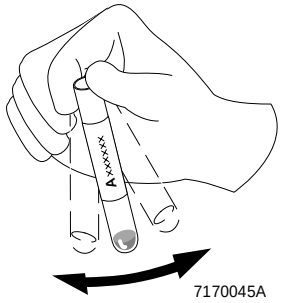
12. Dispense 50 µL of well-mixed sample into the "A" tube. Add directly to the stain and do not let sample run down side of tube.



7170044A

13. Gently mix "A" tube.



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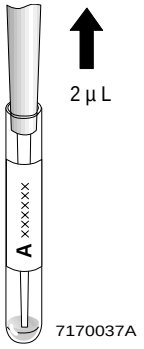
14. Incubate for a minimum of 5 minutes at room temperature of 16 - 30°C (61 - 86°F). Up to 60 minutes is OK. You can incubate samples for up to 60 minutes to allow for batching.

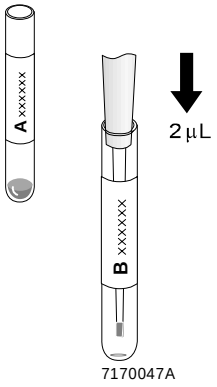
    Repeat steps 10 through 14 for a batch of samples.

15. Gently mix "A" tube. Aspirate 2 µL of the sample/stain mixture from "A" tube.




**IMPORTANT**

**To prevent drying of this small amount of sample, when you finish step 16, go immediately to step 18. Read step 17 and the IMPORTANT that goes with it now.**

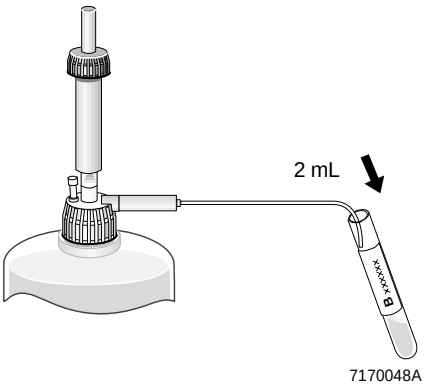



16. Dispense 2 µL of the sample/stain mixture directly into the bottom of the "B" tube. Do not let it run down side of tube.

**IMPORTANT**

**To keep bubbles or foam from forming, let Reagent B run down the side of the tube.**

**Dispense Reagent B quickly enough to mix the reagent and blood mixture. DO NOT MIX FURTHER.**

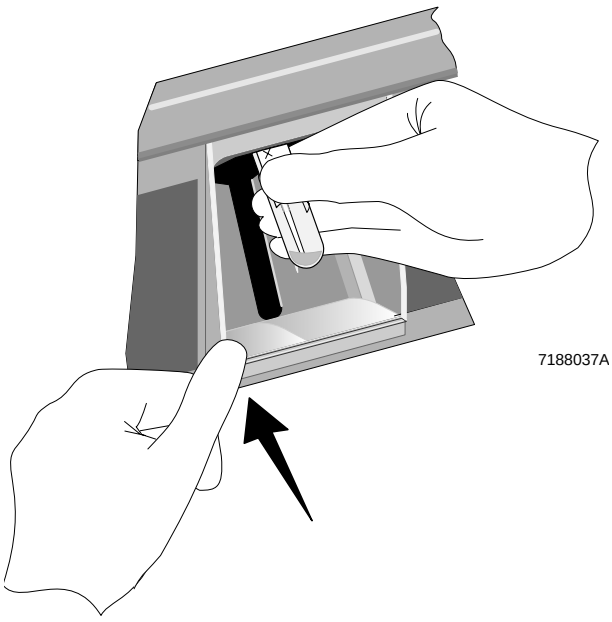


17. Place tube "B" at a 30° angle under the tip of the Reagent B dispenser. Dispense 2 mL of Reagent B in the "B" tube. Do not mix.

18. Wait 30 seconds then analyze the prepared sample:

    a. Immerse the aspirator tip in the dilution.

    b. Press and release the activator.




---

**IMPORTANT**

**Do not remove the sample tube from the aspirator tip until the STATUS message on the Analyzer CRT changes from INTRO SAMPLE to WIPE, and there is a beep.**

---

    c. Remove the dilution when

    - you hear the beep and
    - the Analyzer CRT STATUS field displays *WIPE*.

    d. Wipe the tip with a lint-free tissue.

19. Verify sample ID numbers before you report results.

## Hgb Cuvette Drain

The instrument automatically drains and rinses the Hgb cuvette under the following circumstances.

**Primary mode**

1. When you press Stop, or

2. After the last tube in a batch. The system looks for the next tube for 50 rocks. If it does not find one, it drains and rinses the cuvette.

**Secondary mode**

Approximately 15 minutes after the last CBC or CBC/Diff sample is run, and no sample has been run in the Primary mode.

The drain and rinse routine consists of these functions:

- The Hgb cuvette drains into the waste chamber.
- The RBC bath drains into the waste chamber.
- The WBC bath drains into the Hgb cuvette.
- Diluent refills the baths.

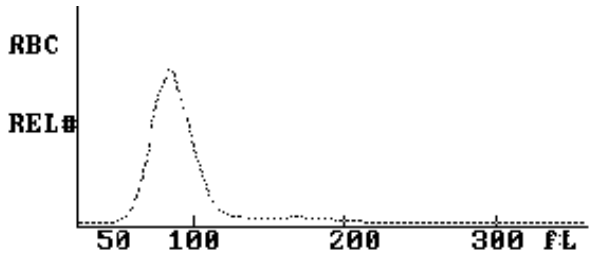
## CBC HISTOGRAMS

**IMPORTANT**

**Do not estimate the number of cells from the distribution curves. Curves show only the relative, not actual, number of cells in each size range.**

### RBC Distribution Curve

The normal RBC curve ranges from 36 to 360 fL. The display starts at 24 fL.

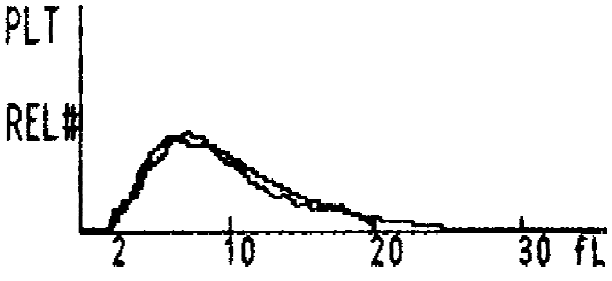



5935-141

### Plt Distribution Curve

Normal Plt distribution yields two curves, both using averaged data. The

- smooth curve derives from raw data and displays between 2 fL and 20 fL.
- fitted curve ranges from 0 to 70 fL and is used to derive the Plt count. Only the area between 0 fL and 36 fL displays.




5935-140

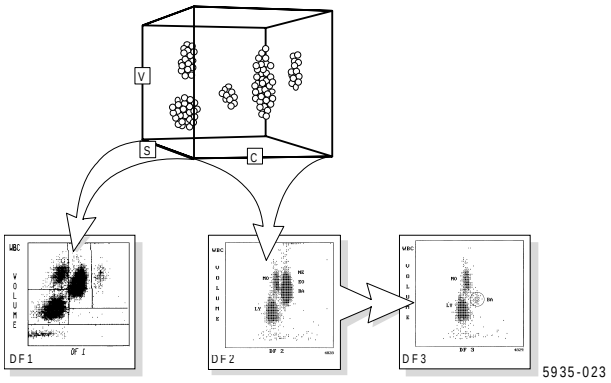
## DIFF SCATTERPLOTS AND HISTOGRAMS

STKS diff reagents maintain white cells in their near native state.

The STKS looks at cells in all three dimensions.

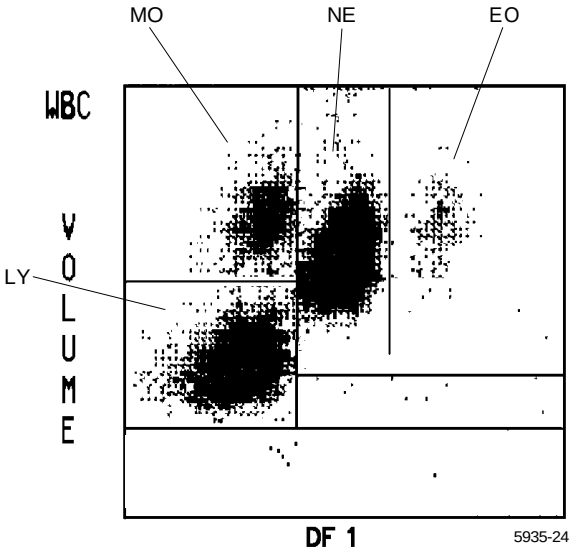
You see results on your screen

- two dimensions at a time
- in three different views.



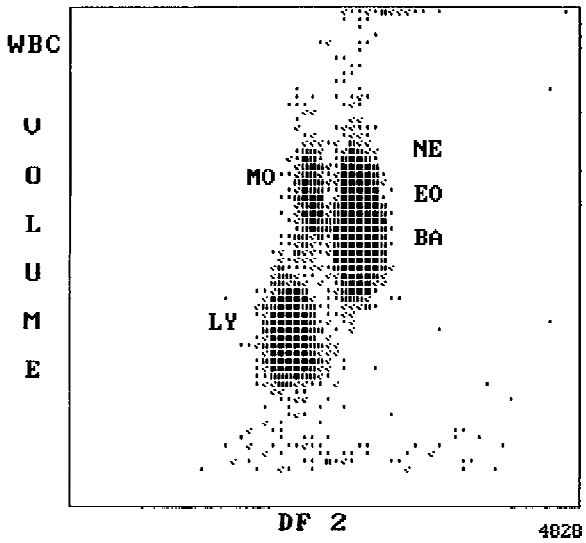

### DF 1 Scatterplot

DF 1 (Discriminant Function 1) is the scatterplot that automatically appears with CBC/Diff sample data. It is derived primarily from volume and light scatter. The Y-axis represents volume, and the X-axis light scatter. Lymphocytes, monocytes, neutrophils, and eosinophils are shown with high resolution. The basophil population is brought into view as the three-dimensional axis is rotated to present the DF 3 display.



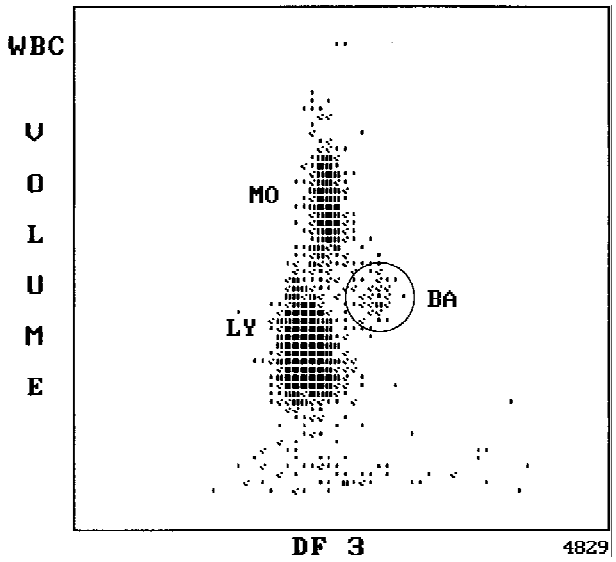
## DF 2 Scatterplot

DF 2 is derived primarily from conductivity. From this perspective, lymphocytes, monocytes and granulocytes are the prominent populations. The granulocytes include the neutrophils, basophils and eosinophils.



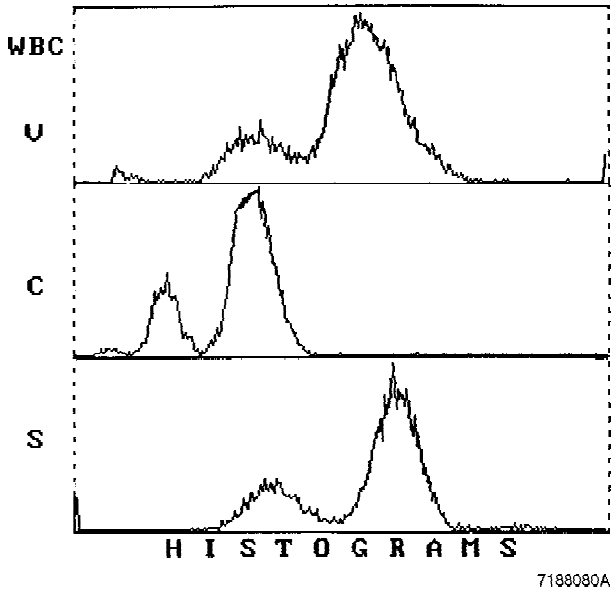

## DF 3 Scatterplot

DF 3 displays the same data as DF 2 with the neutrophil and eosinophil populations gated out. Basophil, lymphocyte and monocyte cell populations exhibit pronounced distinction when viewed from this perspective.



### Single Parameter Histograms

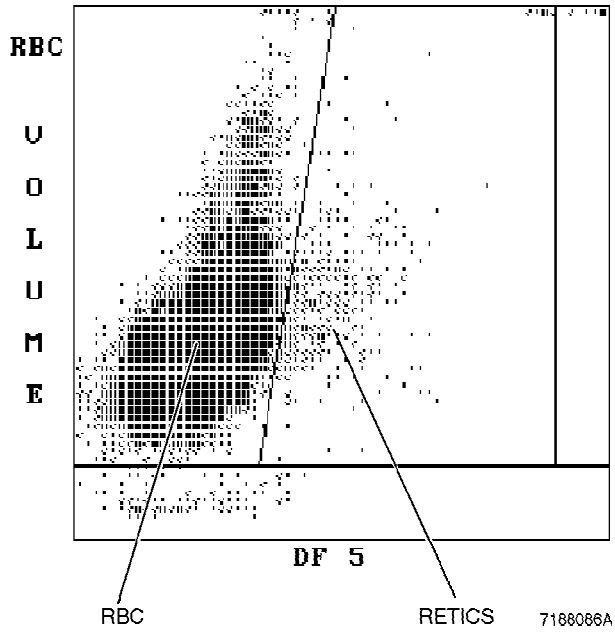
Single parameter histograms of volume, conductivity and light scatter are also available for Diff and Retics. These are used primarily for troubleshooting by Service.




## RETICULOCYTE SCATTERPLOTS

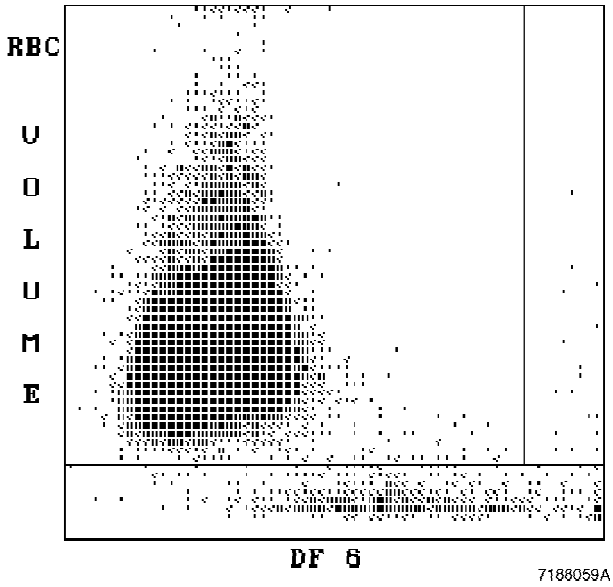
### DF 5 Scatterplot

This is the initial display of Retic analysis. It derives primarily from light scatter and volume. The Y axis represents volume. Mature RBCs appear to the left of the Retic discriminator. Retics appear to the right of it. WBCs appear high to the far right.



## DF 6 Scatterplot

F6 then Alt F2 rotates the cube. You cannot readily see Retics from this screen as they appear in front of the RBC population.




# PARAMETER REVIEW

## Precision of Results

Results, and the calculations performed on those results, appear as a preset number of decimal places on the screen. However, the DMS uses more decimal places than it displays and rounds off to the result you see on the screen, thus maximizing precision.

## CBC/DIFF Codes

If an R flag occurs, review results.

**Table 5 CBC/DIFF Parameter Codes**

| On DMS Display | Cause |
|---|---|
| **All Parameters** | |
| "....." for a parameter result | Incomplete computation. |
| "....." for **all** parameter results | Partial aspiration, Power Supply failure or Analyzer clock failure. If Power Supply or Analyzer clock failure occurs, *PART. ASP* message appears in STATUS field of Run Samples screen. |
| | *continued* |

**Table 5 CBC/DIFF Parameter Codes**

| On DMS Display | Cause |
|---|---|
| *continued* | |
| "-----" for CBC parameter results, and no average histogram for the affected parameter<br>If WBC is "-----", then LY#, MO#, NE#, EO#, and BA# are "....." | Total voteout (at least 2 out of 3 measurements do not agree). Diff parameters do not vote out. |
| "+++++" for parameter results | **IMPORTANT**<br>**If the WBC, RBC, Hgb or Plt result is +++++, to prevent carryover to the next sample, run a blank cycle.**<br>Result exceeds printable range:<br>RBC > 10.00 x $10^6$<br>Plt > 1000. x $10^3$<br>MCV > 1000.<br>WBC > 100.0 x $10^3$<br>If WBC is overrange<br>an R appears next to the RBC, Hgb, Hct, MCV, MCH, MCHC, RDW, MPV, Plt and Diff% results. Results for Diff # are dots (....).<br>If RBC is overrange<br>an R appears next to Hct, MCH and MCHC results.<br>If Hgb is overrange<br>an R appears next to MCH and MCHC results.<br>If MCV is overrange<br>an R appears next to Hct, MCHC and RDW results.<br>If Plt is overrange<br>an R appears next to WBC, Hgb, MCH, MCHC, diff number and Pct results.<br>Average values for overrange WBC, RBC or Plt are displayed in Data Base Query, F3 **Edit**, beneath the Definitive flag section. Press End to see them. These values are provided for review only; do not report them. |
| | *continued* |

**Table 5 CBC/DIFF Parameter Codes**

| On DMS Display | Cause |
|---|---|
| *continued* | |
| "+++++" for parameter results (con't) | **IMPORTANT**<br><br>**Sample dilutions may result in erroneous differential results.**<br><br>When WBC is overrange, if you dilute the sample to rerun it, be sure to set the instrument to CBC↑ before you cycle the diluted sample. |
| "H" next to parameter result | Result is higher than the laboratory-set patient high action limit. |
| "L" next to parameter result | Result is lower than the laboratory-set patient low action limits. |
| **Plt Parameters** | |
| "R" next to Plt and MPV results | PDW > 20, mode not between 3 and 15, or non-positive curve detected, or<br><br>Plt < 20,000, or<br><br>Total voteout of fitted curve, or WBC is overrange. |
| **RBC Parameters** | |
| "R" next to RDW result | Excessive asymmetry in RBC histogram, or WBC or MCV overrange. |
| "*R" next to MCV; also "R" next to RBC, Hct, MCH, MCHC, RDW, Plt, and MPV | MCV < 50 fL |
| **WBC Parameters** | |
| "*R" next to WBC; also "R" next to Diff numbers | Check of WBC lower threshold failed |
| "R" next to Diff percentages and numbers | Low differential count statistics. These messages occur also:<br>Population message: ABNORMAL WBC POP.<br>Suspect message: REVIEW SLIDE. |
| ":::::" for Diff results | System detected a clog in the flow cell. There are three types of clogs:<br>FC - Full Clog<br>PC1 - Partial Clog 1<br>PC2 - Partial Clog 2 |

## Reticulocyte Codes

If any of the following flags occur, review results for the affected parameter(s) according to your laboratory's protocol.

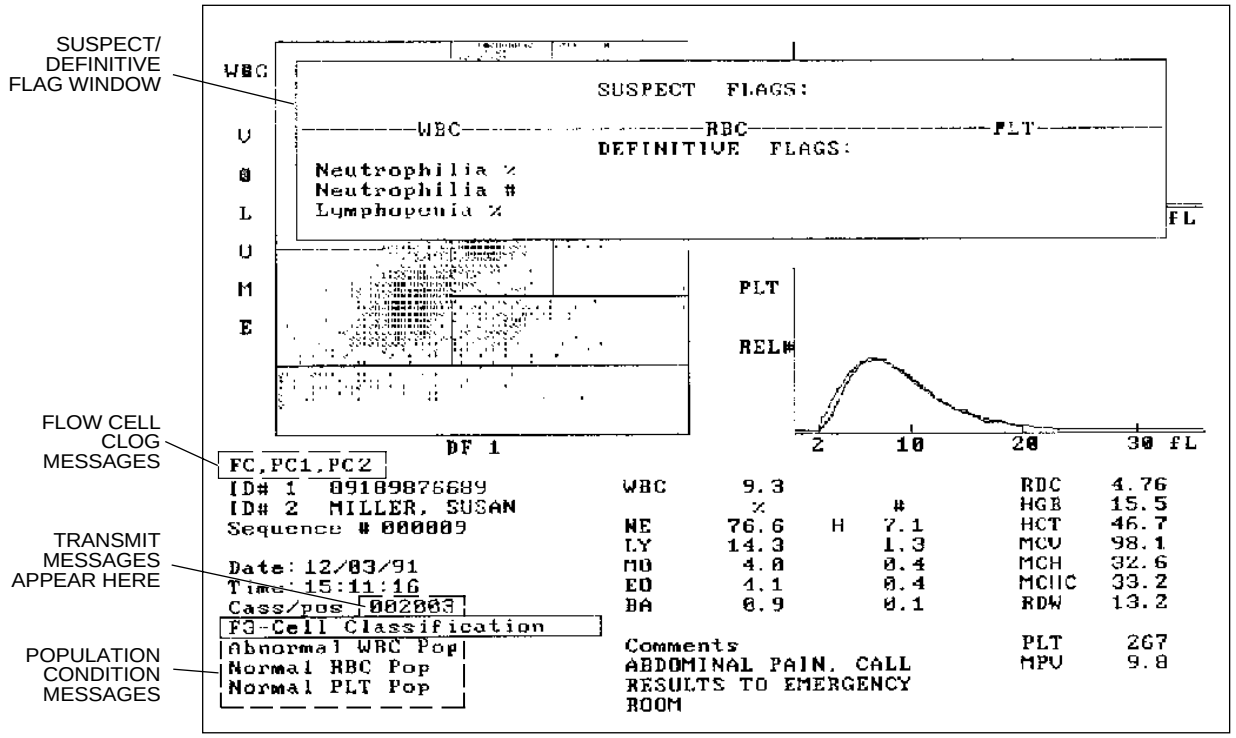
**Table 6 Retic Codes and Messages**

| On DMS Display | Cause | Message in Condition Box |
|---|---|---|
| ::::: FC under Scatterplot | Full clog | VERIFY RETIC |
| ..... | Incomplete.<br>Not enough events. | VERIFY RETIC |
| RBC XX.XXE<br>RET# .XXXXe | E = Operator entered RBC<br>e = Parameter calculated from edited or manually entered RBC or Retic | EDITED DATA |
| RET# .XXXXE | Operator edited RET# | EDITED DATA |
| RET% XX.XXE | Operator edited RET% | EDITED DATA |
| RET% XX.XX+<br>RET# .XXXXR | RET% >30.0 | VERIFY RETIC |
| RET% XX.XXR<br>RET# .XXXXR | RET% <0.5 or<br>Abnormal data pattern | VERIFY RETIC |
| RET% XX.XXL or XX.XXH<br>RET# .XXXXL or .XXXXH | Results < or > Action Limits | VERIFY RETIC |
| RET# +++++ | Exceeds limit of display for RET# when data is edited | EDITED DATA |
| RET% ????? | Invalid data. RET% <0.00 or >100.0 | VERIFY RETIC |

## Messages

There are four types of messages:

Population Condition
Definitive
Suspect
Analyzer Transmit

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## Population Condition Messages

### WBC, RBC, Plt, Retic

Condition messages describe the WBC (including Differential, if performed), RBC and Plt populations. These messages occur in the lower left corner of the Run Samples screen. They indicate the WBC, RBC, Plt and Retic population status only. If there is a voteout for WBC, RBC or Plt, no message appears for the respective parameter. If CBC only is performed, population messages refer to WBC, RBC and Plt counts only.

### WBC Differential

A nonnumeric Diff percent result gives an *Abnormal WBC Population* message. The abnormal WBC message may not signal only morphological abnormality. When paired with a non-numeric result such as ....., or :::::, it is due to partial clogs, full clogs, incomplete computations. Verify results according to your laboratory procedures. See Table 7.

The differential count for all parameters, when totaled, equals 100% except when ALL differential parameters appear as zeros. If the differential count displays all zeros, check for additional flagging and take appropriate action according to your laboratory's protocol.

**Verify Retic**

*Verify Retic* is a comprehensive message that appears at the bottom of the population message window. It occurs whenever the Retic parameter is a nonnumeric result, or when the Retic value is accompanied by any of these flags: +, R, H, L. Note that conditions can exist where a *Normal RBC Population* message occurs, but Retic is flagged or not available.

**Edited Data**

The *Edited Data* message appears for WBC, RBC and Plt populations when these parameters have been edited by the operator. When Retics are edited, the Edited Data message appears on the RBC population line.

## Suspect Messages

Suspect messages flag an abnormal cell distribution or population. The system generates these messages according to an internal algorithm. These messages appear in the Cell Classification window on the Run Samples screen. F3 toggles this window on and off. Confirm any abnormality by microscopic review. See Table 7.

## Definitive Messages

Definitive messages flag results based on numeric limits entered by the laboratory for certain parameters. If the results of a sample exceed the limits, the system generates a message. Table 8 lists the limits which, if exceeded, generate the Definitive flags. These messages appear in the Cell Classification window on the Sample Analysis screen. F3 toggles this window on and off. Results that generate these messages may require review according to your laboratory's protocol for that particular condition. See also Table 7.

Note the following circumstances:

1. An overrange (+++++) parameter result does not generate a Definitive message.

2. With a colon (::::) code for the differential results, if the WBC count exceeds the limits for Leukopenia or Leukocytosis, then these messages are generated.

3. If a Pancytopenia message occurs, then neither a Leukopenia nor a Thrombocytopenia message is generated.

**Table 7 Summary of Flagging Messages**

| Parameter | Condition | Suspect | Definitive |
|---|---|---|---|
| WBC | Normal WBC Pop<br>Abnormal WBC Pop<br>Edited Data<br>No message | Blasts<br>Imm Grans/Bands 1<br>Imm Grans/Bands 2<br>Variant Lymphs<br>Review Slide | Leukopenia<br>Leukocytosis<br>Neutropenia<br>Neutrophilia<br>Lymphopenia<br>Lymphocytosis<br>Monocytosis<br>Eosinophilia<br>Basophilia |
| RBC | Normal RBC Pop<br>Abnormal RBC Pop<br>Edited Data<br>No message | NRBCs<br>Dimorphic RBC Pop<br>Micro RBCs/<br>RBC Fragments<br>RBC Agglutination | Anemia<br>Anisocytosis<br>Microcytosis<br>Macrocytosis<br>Hypochromia<br>Poikilocytosis<br>Erythrocytosis<br>Pancytopenia |
| Plt | Normal Plt Pop<br>Abnormal Plt Pop<br>Edited Data<br>No message | Platelet Clumps<br>Giant Platelets | Thrombocytopenia<br>Thrombocytosis<br>Small Platelets<br>Large Platelets |
| Retic | Verify Retic<br>No message | NA | NA |

**Table 8 Definitive Flagging Limits**

| For this Flag | This Message | Indicates the Result Exceeds this Limit |
|---|---|---|
| WBC | Leukopenia | Low limit for WBC |
| | Leukocytosis | High limit for WBC |
| | Neutropenia | Low limit for NE% or NE# |
| | Neutrophilia | High limit for NE% or NE# |
| | Lymphopenia | Low limit for LY% or LY# |
| | Lymphocytosis | High limit for LY% or LY# |
| | Monocytosis | High limit for MO% or MO# |
| | Eosinophilia | High limit for EO% or EO# |
| | Basophilia | High limit for BA% or BA# |

*continued*

**Table 8 Definitive Flagging Limits**

| For this Flag | This Message | Indicates the Result Exceeds this Limit |
|---|---|---|
| *continued* | | |
| RBC | Anemia | Low limit for RBC or for Hgb |
| | 1+ Anisocytosis | High limit for RDW |
| | 2+ Anisocytosis | A gradient range from 1+ Anisocytosis |
| | 3+ Anisocytosis | A gradient range from 2+ Anisocytosis |
| | 1+ Microcytosis | Low limit for MCV |
| | 2+ Microcytosis | A gradient range from 1+ Microcytosis |
| | 3+ Microcytosis | A gradient range from 2+ Microcytosis |
| | 1+ Macrocytosis | High limit for MCV |
| | 2+ Macrocytosis | A gradient range from 1+ Macrocytosis |
| | 3+ Macrocytosis | A gradient range from 2+ Macrocytosis |
| | 1+ Hypochromia | Low limit for MCH |
| | 2+ Hypochromia | A gradient range from 1+ Hypochromia |
| | 3+ Hypochromia | A gradient range from 2+ Hypochromia |
| | 1+ Poikilocytosis | High limit for RDW and Low limit for MCH |
| | 2+ Poikilocytosis | A gradient range from 1+ Poikilocytosis |
| | 3+ Poikilocytosis | A gradient range from 2+ Poikilocytosis |
| | Erythrocytosis | High limit for RBC |
| | Pancytopenia | Low limit for WBC **and** RBC **and** Plt |
| Plt | Thrombocytopenia | Low limit for Plt |
| | Thrombocytosis | High limit for Plt |
| | Small Platelets | Low limit for MPV |
| | Large Platelets | High limit for MPV |

## Analyzer Transmit Messages

Analyzer Transmit messages describe various transmissions from the Analyzer to the DMS. Analyzer messages appear in the Cass/Pos field on the DMS screen. See Table 9.

**Table 9 Transmit Messages**

| Message | Description |
|---|---|
| *Xmit DMS* | Appears when Primary mode results are transmitted manually from the Analyzer via TRANSMIT TO DMS. |
| *SXmit DMS* | Appears when Secondary mode results are transmitted manually from the Analyzer via TRANSMIT TO DMS. |
| *Ramp* | Appears when a Ramp test is sent from the Analyzer. |
| *Precision* | Appears when a Precision test is sent from the Analyzer. |
| *S* | Appears when a Secondary mode sample result or a Background test is sent from the Analyzer. |

These related topics are dealt with elsewhere in this manual:

- Collating
- Data Base Query
- Sample Analysis Display
- Status Line
- Workload Recording

## DAILY SHUTDOWN

At least once every 24 hours, perform a Shutdown cycle and let cleaning agent sit in the unit for **at least** 30 minutes.

To start a Shutdown cycle:

Press SHUT DOWN.

At the end of the cycle, the pneumatic subsystem automatically shuts down.

## PROLONGED SHUTDOWN

Perform the following Shutdown procedure if you turn off the power at night, and the STKS is going to be idle for more than 48 hours.

1. Press SHUT DOWN. Let cleaning agent remain in the instrument for at least 30 minutes.
2. Press START UP to put diluent in the lines.
3. According to your laboratory's protocol, either power down or leave power on.
4. When you are ready to use the instrument again, turn power on if necessary.
5. Press F 1 7 ENTER to prime the 5-part Diff reagents.
6. Put the DMS in the Startup mode and press START UP. Verify that results are within tolerance.

7. Perform and verify Quality Control checks per your laboratory's protocol.

8. Operate as usual.

## AUTOPURGE

If 24 hours elapse with the power on, the pneumatics off, and the instrument in shut down, the system automatically:

- Turns on the pneumatics.
- Displays the message *AUTOPURGE* on the Diluter keypad.
- Purges the flow cell and associated sample lines with cleaning agent.
- Turns off the pneumatics.

This chapter describes the Analyzer CRT functions, in the order they appear on the MAIN MENU:

ANALYZER FUNCTIONS
SYSTEM CONFIGURATION
TURN PNEUMATICS OFF
SYSTEM RUN

Each function is illustrated by a series of screens. The black key indicates which key to press to access the next screen. When a function is being performed, a message describing it backlights in the message area.

The MAIN MENU also displays the Analyzer cycle counter.This counter increments at the beginning of these cycles:

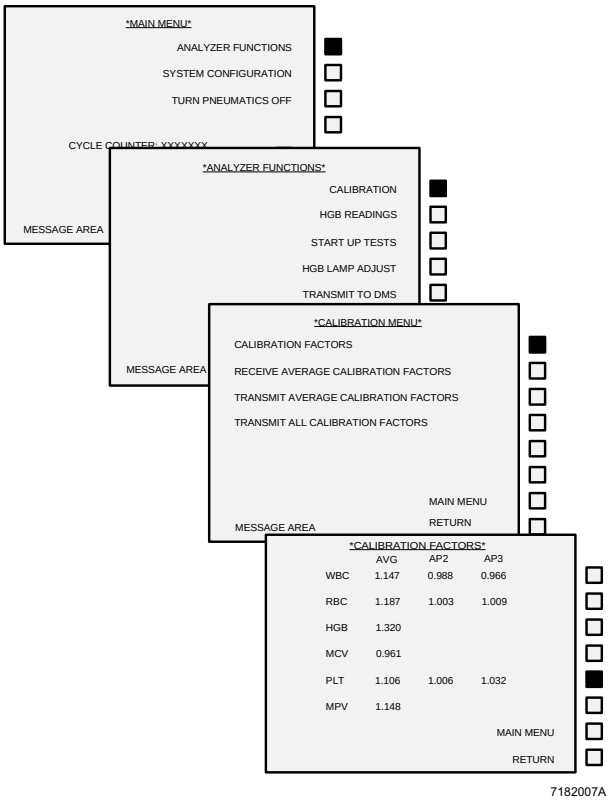
All primary
All secondary except Latex functions F55, F56, F57
Background test
Startup

A menu summary is included at the end of this chapter. The numbers on the summary refer to that option's line/key position, starting from the top. Not every screen has all the positions filled, thus there are missing numbers in some sequences.

Be sure that all elements of your system that have configuration options are set the same.

# CALIBRATION FACTORS

Key Sequence: 1,1,1,5




7182007A

This function displays

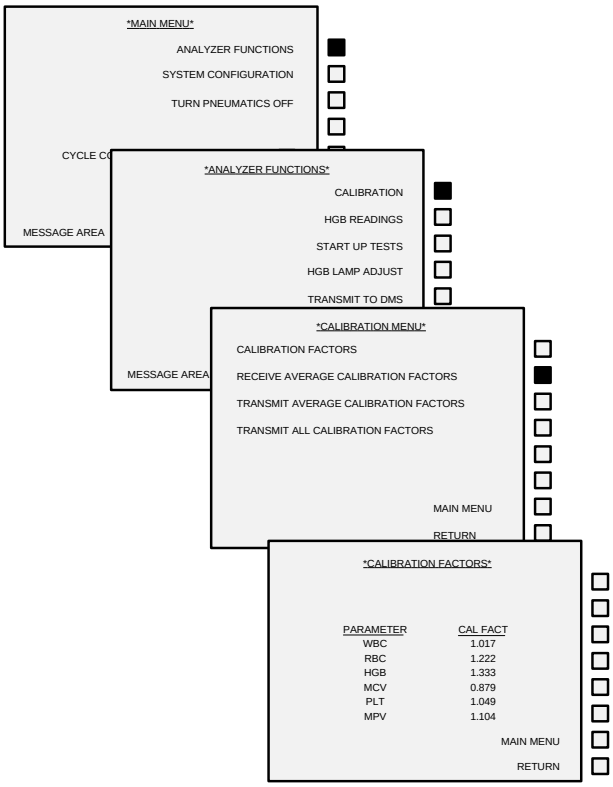
- the average (AVG),
- aperture 2 (AP2), and
- aperture 3 (AP3) calibration factors

for WBC, RBC, Hgb, MCV, Plt, and MPV.

In this function, you can change calibration factors by pressing the corresponding key as many times as necessary to backlight the desired factor. For example, to change the factor for Plt aperture 2, press the fifth key and the Plt average factor backlights; press the fifth key again and the Plt aperture 2 factor backlights. On the Diluter keypad, enter the desired factor and press **Enter**; the new factor appears on this screen.

# RECEIVE AVERAGE CALIBRATION FACTORS

Key Sequence: 1,1,2



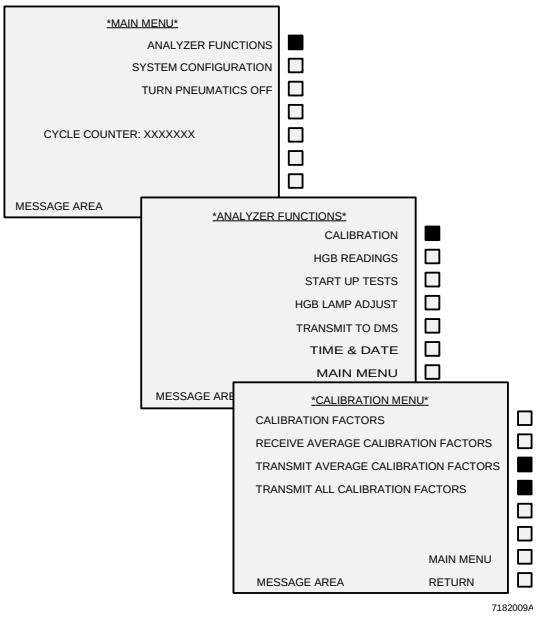

7182008A

This function lets the Analyzer receive calibration factors from the DMS calibration option.

Press the key next to this function, then transmit the factors from the DMS.

## TRANSMIT CALIBRATION FACTORS

Key Sequence: 1,1,3 and 1,1,4



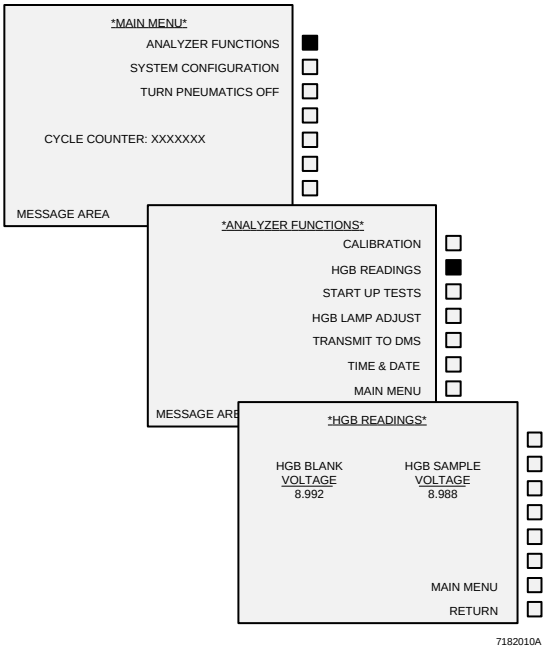

Use these functions as indicated to transmit from the Analyzer to the DMS, either the average calibration factors, or the average and individual aperture factors.

- Transmit the average factors at the beginning of calibration
- Transmit all factors when calibration is complete and you are ready to record the values.

In either case, the DMS must be in the correct calibration function to accept the transmission.

## HGB READINGS

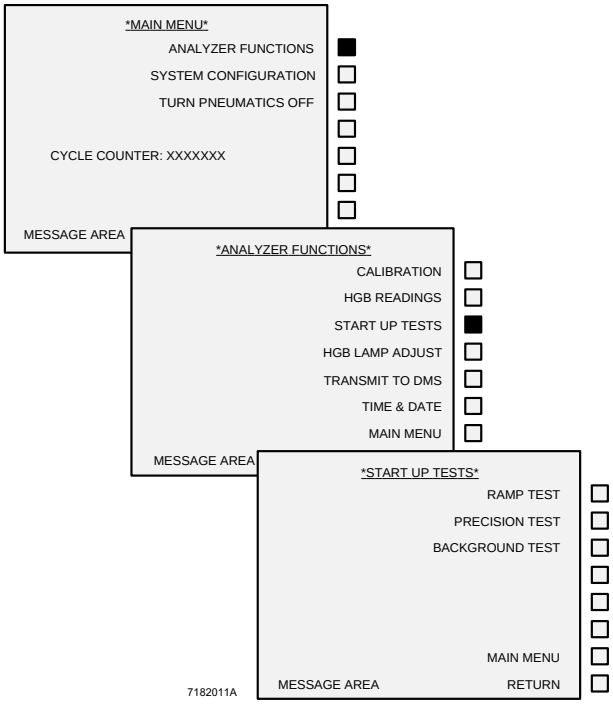
Key Sequence: 1,2




This function displays the Hgb-blank voltage and the Hgb-sample (read) voltage for the last completed cycle.

# START UP TESTS

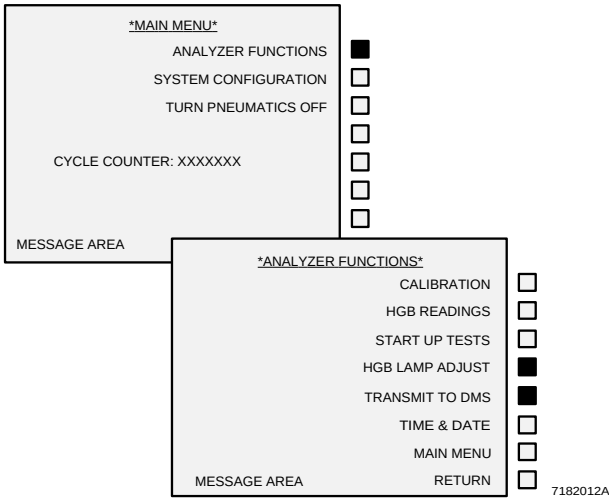
Key Sequence: 1,3




Use this function to perform the ramp, precision and background tests. The background test includes background, Hgb voltages and diff test. When you press the key, the system automatically performs the test and sends results to the DMS.

# HGB LAMP ADJUST AND TRANSMIT TO DMS

Key Sequence: 1,4 and 1,5




## HGB LAMP ADJUST

Use this function, with the pneumatics on and diluent (not cleaning agent) in the baths, to check the Hgb lamp voltage. In the message area the message appears: *PERFORMING HGB LAMP ADJUST*. When the adjustment is complete, the message appears: *LAMP VOLTAGE ADJUSTED*. If a Level Sense message occurs during this procedure, press the key next to MAIN MENU to continue.

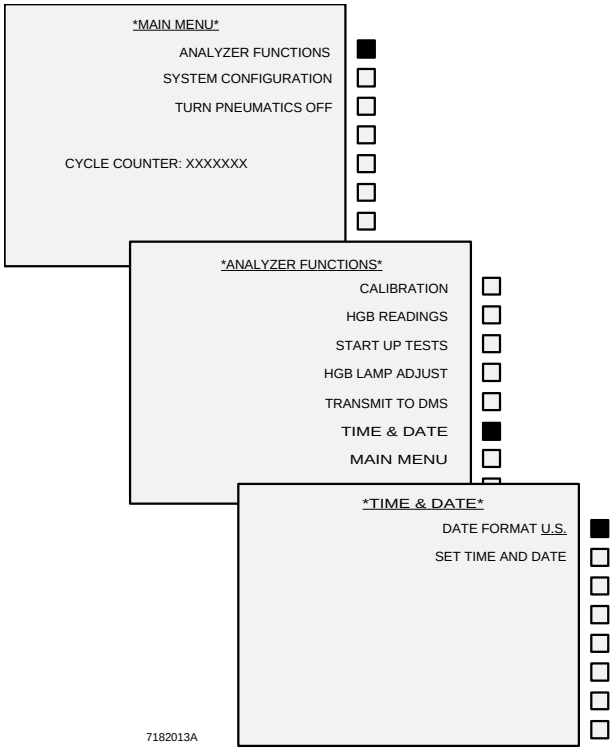
## TRANSMIT TO DMS

Use this function to transmit from the Analyzer to the DMS the data of the last run cycle. Be sure the DMS is in a receiving mode. In the message area the message appears: *TRANSMITTING DATA TO DMS*.

Data transmitted this way does not go into the data base.

# SET DATE FORMAT

Key Sequence: 1,6,1




Use this function to select the date format.

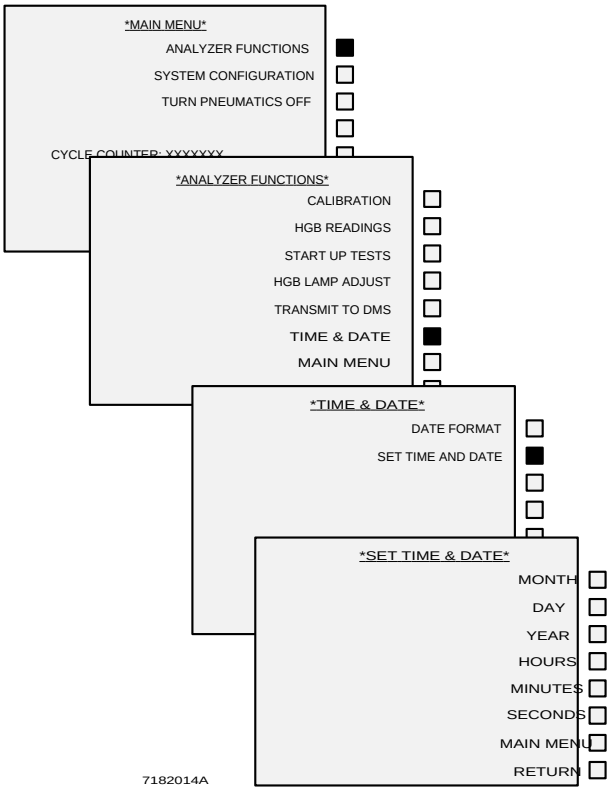
Press the key next to DATE FORMAT to toggle between these choices:

| | |
|---|---|
| U.S. | MM/DD/YY |
| EUROPEAN | DD/MM/YY |
| JAPANESE | YY/MM/DD |

Cycle the system in any mode except latex control to transfer the date format to the DMS.

## SET TIME AND DATE

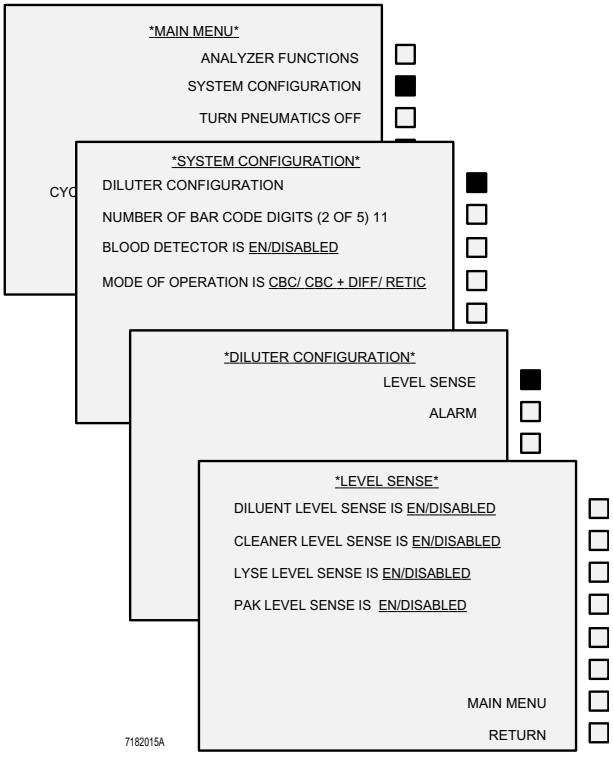
Key Sequence: 1,6,2




Use this function to set the time and the date. On the Diluter keypad, enter the correct values for the month, day, year, hours, minutes and seconds, then press Enter after each entry. These settings are transmitted to the DMS with all cycles except Latex control.

# DILUTER CONFIGURATION, LEVEL SENSE SETTINGS

Key Sequence: 2,1,1

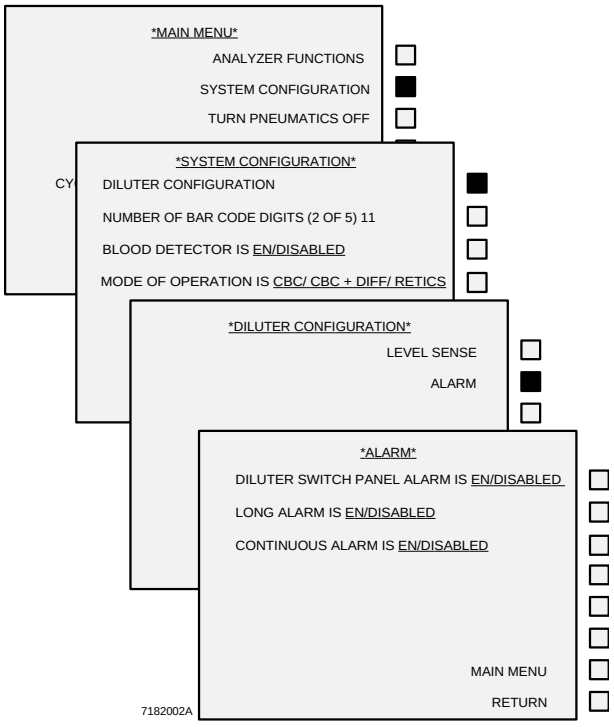



Use this function to enable or disable the level sensors.

Press the key next to the option to change the setting.

## DILUTER CONFIGURATION, ALARM SETTINGS

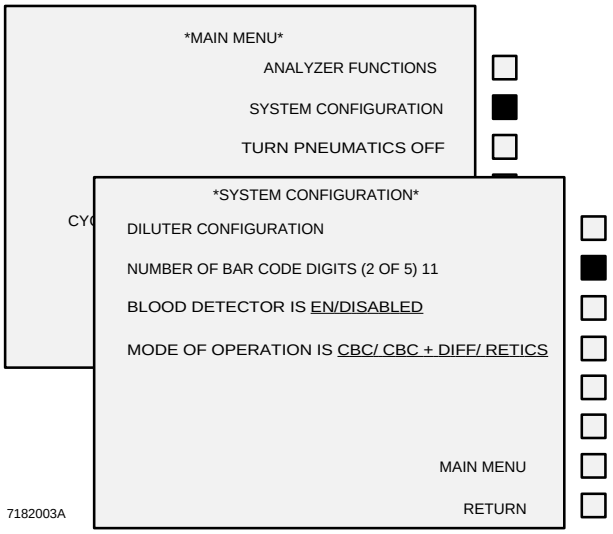
Key Sequence: 2,1,2




Use this function to enable or disable the alarms. Press the key next to the option to change the setting.

## NUMBER OF BAR-CODE DIGITS

Key Sequence: 2,2



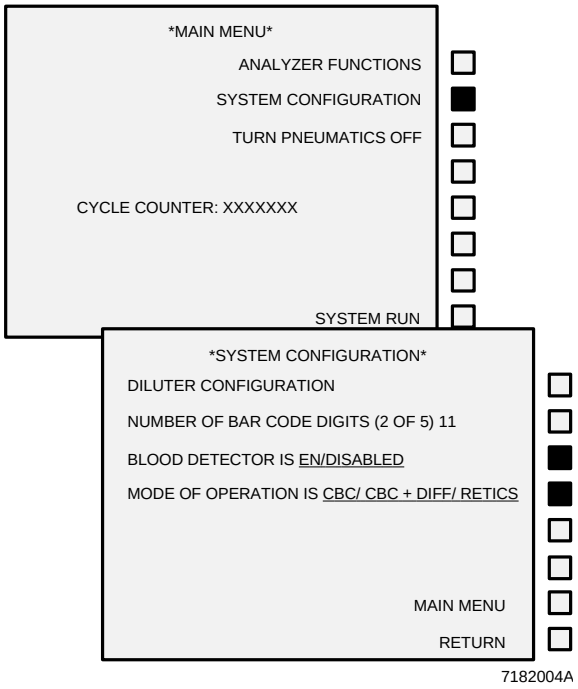

Use this function to set the number of bar-code digits for Interleaved 2-of-5.

Enter the number on the Diluter keypad and press **Enter**. You must use at least three digits; you can use up to 11.

If you want to change the number of bar-code digits, you must delete the DMS data base before you can use the new configuration.

## OTHER SYSTEM OPTIONS

Key Sequences: 2,3; 2,4




In addition to setting the Diluter configuration and the number of bar code digits, use this function to:

- Enable or disable the blood detector.
- Set the mode of operation to

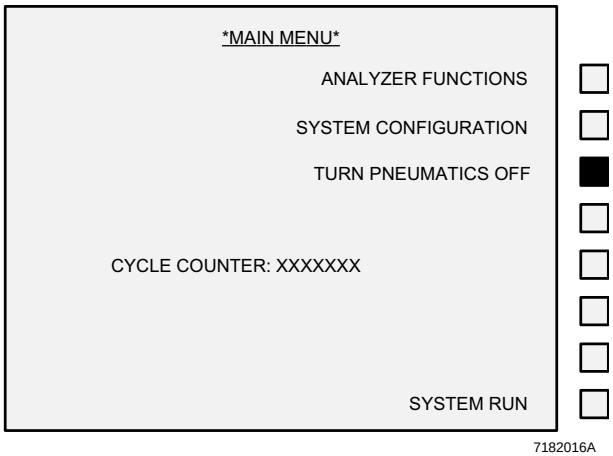
  CBC or
  CBC+DIFF or
  RETICS

Press the key next to the option to change the setting.

The current status of these two options is indicated by an arrow at the bottom of the SYSTEM RUN screen. ↑ indicates on; ↓ indicates off.

## TURN PNEUMATICS OFF

Key Sequence: 3

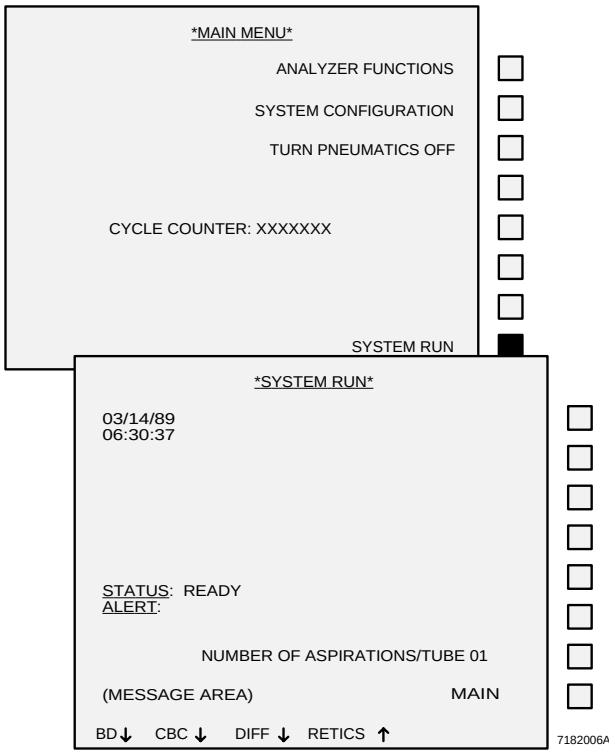



Use this function to turn off the compressor if you do not want to wait 1 hour for it to time out.

Wait at least 30 seconds before you turn the pneumatics back on.

The Diluter keypad displays the message *COMPRESSOR OFF*.

## SYSTEM RUN



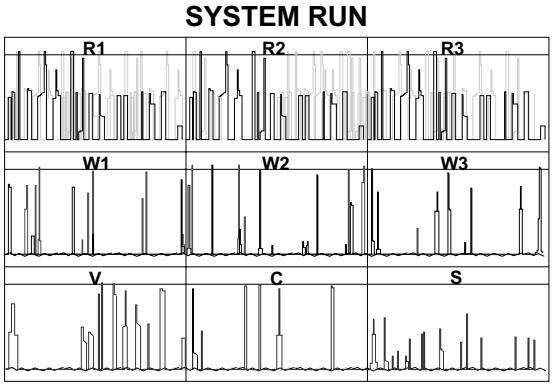

Use this function when cycling. It displays the following:

- Date and time.
- The voting matrix is displayed here if there is a voteout, and it designates which aperture and parameter voted out.
- The number of aspirations per tube, which is also set from this screen by pressing the key next to this line and entering the number on the Diluter keypad. Maximum number of aspirations is 12.
- STATUS messages describe the status of the cycle. They are:

  *NOT READY*
  *READY*
  *INTRO SAMPLE*
  *COUNT*
  *ANALYZE*
  *WIPE (Secondary mode)*
  *BACKWASH*
  *SYSTEM FAULT*
  *ACTIVE (Primary mode)*
  *READ HGB*
  *STKS INITIALIZING*
  *PRIME*
  *RINSE*
  *AUTOCLEARING*
  *CHECKING PRESSURES*
  *READY (Retics must be diluted)*
  *COUNT COMPLETED*

- ALERT messages inform you of conditions that may warrant attention. These messages are described in the Special Procedures and Troubleshooting manual, PN 4237187.
- The current settings for the blood detector (BD), and the mode of operation (CBC, DIFF, RETIC). ↑ indicated enabled, ↓ indicates disabled.

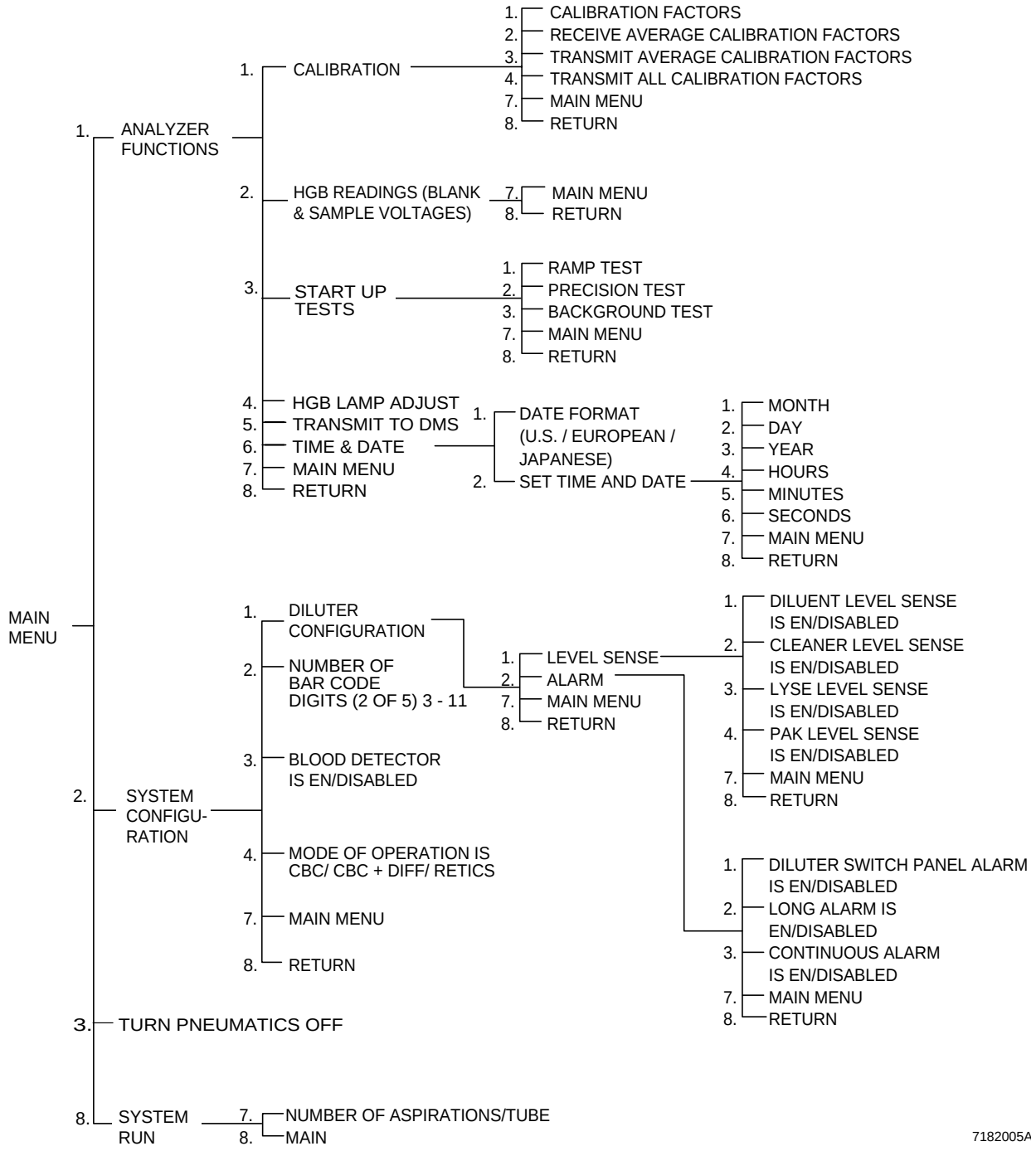
## Analyzer CRT Pulses




Some STKS instruments have an enhanced Analyzer CRT. This CRT displays pulses during the Count portion of each cycle. Use the pulse displays to monitor the condition of all the apertures. You can detect noise, bubbles, or a clogged flow cell.

When DIFFERENTIAL is enabled, the screen shows nine pulse windows: one for each of the three apertures in the RBC bath, one for each of the three apertures in the WBC bath, one for Volume, one for Conductivity and one for Scatter. Illustration is the screen. If your system does not have this Analyzer CRT module, you will not see these pulse patterns.

## ANALYZER CRT MENU SUMMARY



This chapter includes

DMS Keys
Main Menu F5-Other
Status Line
Set Size of Data Base and Worklist
Workload Recording
Action Log
Error Log

## DMS KEYS

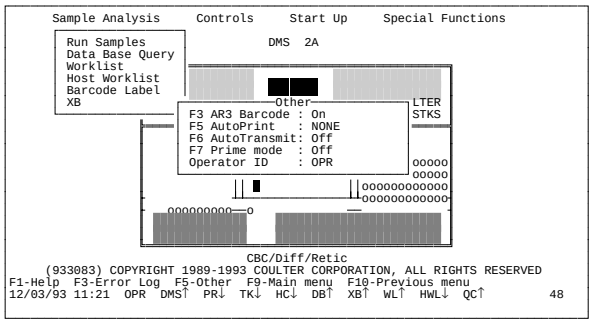
This list gives a general definition of the keyboard. It does not include function keys that are specific to individual screens.

| Key | Function |
|---|---|
| **MOVING THE CURSOR BETWEEN MENU ITEMS AND BETWEEN FIELDS.** | |
| ↓ | Moves cursor down one line or to the next available field. |
| ↑ | Moves cursor up one line or to previous available field. |
| → | Moves cursor one position to the right.<br>Moves Menu highlight bar to next Menu item. |
| ← | Moves cursor one position to the left.<br>Moves Menu highlight bar to previous Menu item. |
| End | Moves cursor to end of the field. |
| Home | Moves cursor to beginning of the field. |
| Tab | Moves cursor to the next available field. |
| Enter | Moves cursor to the next available field. |
| Shift Tab | Moves cursor to the previous field. |
| **SELECTING ITEMS** | |
| Enter | Selects currently highlighted menu item. |
| space bar | Toggles option in certain modes: for example, Yes/No or On/Off |
| Insert | Toggles between insert and overwrite. |
| **GOING TO ANOTHER MENU OR SCREEN** | |
| Esc | Goes to previous screen, or higher menu level. |
| F9 | Goes to the Main menu.<br>Saves data.<br>Saves changes if you are in a setup screen. |

| Key | Function |
|---|---|
| F10 | Goes to the previous menu and saves entered data. |
| PgUp | Moves one page up in a Help file or a scrollable region. |
| PgDn | Moves one page down in a Help file or a scrollable region. |
| | **DISPLAYING SCREENS AND MESSAGES** |
| F2 | Displays a choice list if one is attached to the field you are on. |
| Alt End | Displays last message stored in the Error Log. |
| Alt Home | Displays first message stored in the Error Log if the error line is showing. |
| Alt ↑ | Displays previous message stored in the Error Log if the error line is showing. |
| Alt ↓ | Displays next message stored in the Error Log if the error line is showing. |
| | **CLEARING OR DELETING DATA** |
| Del | Deletes character at the current cursor position. |
| BackSpace | Deletes character to left of the cursor. |
| F6 | Clears a data-entry field. |
| Shift F3 | Clears a data-entry field and displays the original value in the field. |
| Shift F6 | Clears from the cursor to the end of a data-entry field. |
| Alt Esc | Clears error line and resets system stop error. |
| | **SAVING DATA** |
| F9 | Saves data and goes to Main Menu.<br>Saves changes if you are in a setup screen. |
| F10 | Saves entered data and goes to the previous menu. |
| PgDn | In Worklist and Data Base, saves entry. Blanks form to preassign another entry. Automatically enters IDs on Worklist if AutoSeq is on and you indicate a starting number. |
| | **SEEKING AND DISPLAYING HELP** |
| F1 | Displays a help screen.<br>Calls next level of help. |
| Alt F1 | Zooms and unzooms the help window to full screen. |
| End | Moves to the end of a help window. |
| Home | Moves to the top of a help window. |
| PgDn | Moves one page down in a help file. |
| PgUp | Moves one page up in a help file. |
| Enter | Exits help. |
| Esc | Exits help. |

# MAIN MENU F5-OTHER

**Main Menu**
**F5 Other**




When you select **F5 Other** from the Main Menu, you have these options:

**F3** turns the AUTO-REPORTER 3 bar-code reader On and Off.

**F5** sets the Graphic Printer to automatically print

- NONE - do not print any results.
- ALL - print all results.
- NORMAL - print only normal results.
- ABNORMAL - print only cycles that have flagged results.

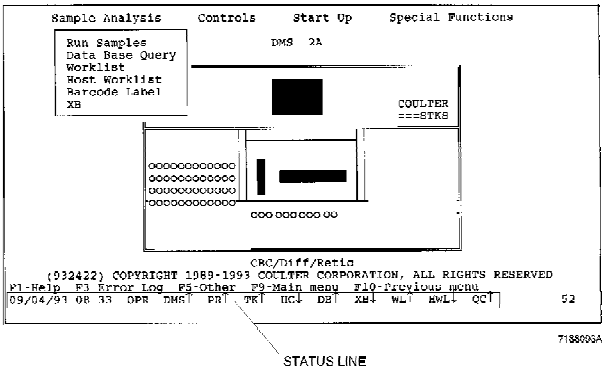
AutoPrint does not apply to Controls.

**F6** turns automatic transmission to the Host computer On and Off. For transmission of Control data, AutoTransmit **must** be set to On in this window, and HOST must be set to On in the control Setup file.

**F7** turns Prime On and Off. When you set Prime to On, AutoTransmit automatically turns off.

Enter or change the three-character ID.

# STATUS LINE



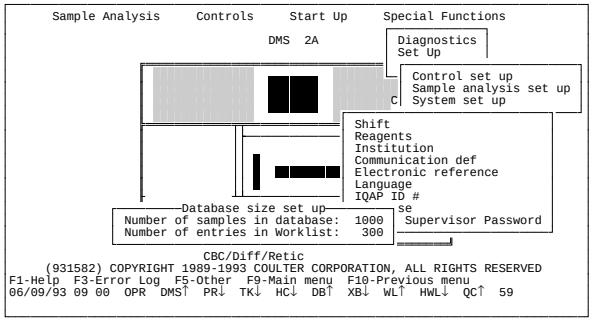

The Status line at the bottom of the screen shows the current date, time and operator identification, and indicates the current status of the various options listed. Background color changes indicate certain conditions: red may require immediate operator attention, yellow indicates busy. Table 10 describes the Status line.

**Table 10 Status Line**

| Symbol | Refers to | ↑ | ↓ | Red | Yellow | White |
|---|---|---|---|---|---|---|
| DMS | DMS | Connected to Analyzer | | Not communicating with Analyzer | DMS busy or receiving data | DMS is OK. |
| PR<br>AU<br>BA<br>MA | GRAPHIC PRINTER<br>Auto print<br>Batch print<br>Manual print | Autoprint is turned on | Autoprint is turned off | Printer is off-line, or Printer is out of paper | Printer is printing | Printer and DMS are connected. |
| TK | Ticket Printer | There is a ticket in the printing mechanism. | There is no ticket in the printing mechanism. | The DMS and the Auto-Reporter 3 are not electronically connected. | The Printer is printing. | The DMS and the Auto-Reporter 3 are electronically connected. |
| HC | Host Computer | AutoTransmit on (Sample Analysis and Control Samples) | AutoTransmit off (Sample Analysis and Control Samples) | Not connected to host | Sending to host computer | Host and DMS are connected. |
| DB | Data Base | Store is turned on | Store is turned off | DB not functional. System stops. Reset Analyzer and DMS, and rerun last 2 samples. | DB storing data | DB is OK. |
| XB | $\bar{X}_B$ Analysis | On | Off | Out (last completed batch) | N/A | Last batch was IN. |
| WL | Worklist | There are preassigned entries pending on WL. | There are no preassigned entries on WL | There are 3 consecutive or 10 total messages in the status field. | The Worklist is full. It has reached the maximum number of entries set in Special Functions. | WL is OK. |
| HWL | Host Worklist | There are preassigned entries in the HWL. | There are no preassigned entries in HWL. | HWL is full. | DMS is receiving preassigned samples from the host computer. | HWL is OK. |
| QC | Quality Control | Auto-Stop is ON. | Auto-Stop is OFF. | Last control run had an error message. | Receiving a control run. | Results of last control run were OK. |

# SET SIZE OF DATA BASE AND WORKLIST

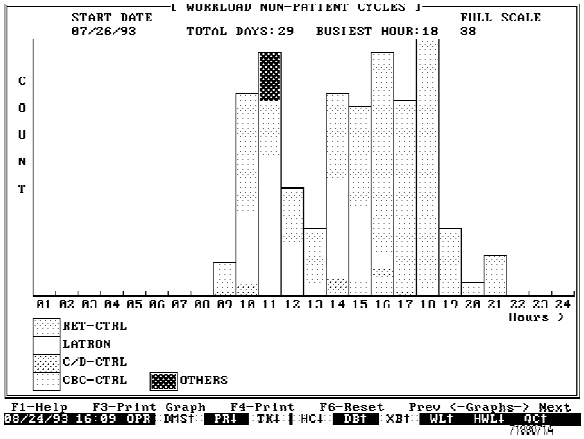
**Special Functions**
**Set Up**
**System Set up**
**Data Base**




Use this function to set the maximum number of records allowed in the Data Base and Worklist.

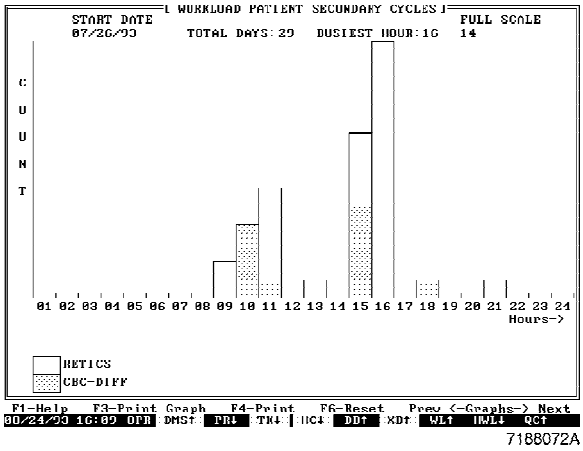
- Data Base: choice is from 500 to 5000. To enter a number that is less than the current number of samples in the Data Base, you must first delete the Data Base.
- Worklist: choice is from 100 to 1000. To enter a number that is less than the current number of entries in the Worklist, you must first delete the Worklist.
- The number of records in the Worklist cannot exceed what is set for Data Base.
- The size set for Data Base must be equal to or greater than the size set for Worklist.

# WORKLOAD RECORDING




The Workload Recording feature keeps a log of all samples cycled. It is a graph of accumulated data displayed in 24 single time periods. There are three types of graphs available:

- Patient Primary cycle
- Patient Secondary cycle
- Non-patient cycle

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Each graph is color coded:

| Color | Primary | Secondary | Non-Patient |
|---|---|---|---|
| Green | CBC-DIFF | CBC-DIFF | CBC-CAL |
| Red | CBC | CBC | CBC-CTRL |
| Lt Magenta | | | C/D-CTRL |
| Blue | | RETICS | LATRON |
| Magenta | | | RET-CTRL |
| Yellow | | | OTHERS:<br>CARRYOVER<br>REPRODUCIBILITY<br>STARTUP<br>BACKGROUND<br>PRIME<br>SERVICE TESTS |

The Workload Recording operation logs data for up to

- 365 days, or
- a count of 1166400

When it reaches either of these points, it

- initiates a printout of all Workload data with a related message printed on each page
- resets the Workload counter and

- restarts the accumulation process

When it reaches 365 days of accumulation, this message appears on the Error line and is posted to the Error Log:

*WORKLOAD - MAXIMUM DAYS REACHED - ACCUMULATION RESTARTED*

When it reaches a count of 1166400, this message appears on the Error line and is posted to the Error Log:

*WORKLOAD - MAXIMUM COUNT REACHED - ACCUMULATION RESTARTED*

If the date received is less recent than the last sample received, this message appears on the Error line and is posted to the Error Log.

*Previous date rcvd*

Function keys available:

**F1 Help**

**F3 Print Graph**
Prints the screen.

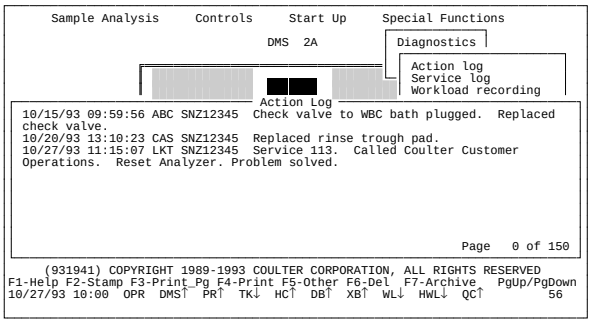
**F4 Print** Print statistics of Workload Patient Primary, Patient Secondary and Non-patient cycles.

**F6 Reset** Resets data to zero and begins accumulation again. Data is automatically printed with message *WORKLOAD DATA DELETED BY USER* on each page.

**← → Next Graph**
Toggles between Patient Primary, Patient Secondary and Non-patient cycle graphs.

# ACTION LOG

**Special Functions**
**Diagnostics**
**Action Log**


Sample Analysis
Controls
Start Up
Special Functions
DMS 2A
Diagnostics
Action log
Service log
Workload recording
Action Log
10/15/93 09:59:56 ABC SNZ12345 Check valve to WBC bath plugged. Replaced check valve.
10/20/93 13:10:23 CAS SNZ12345 Replaced rinse trough pad.
10/27/93 11:15:07 LKT SNZ12345 Service 113. Called Coulter Customer Operations. Reset Analyzer. Problem solved.
Page 0 of 150
(931941) COPYRIGHT 1989-1993 COULTER CORPORATION, ALL RIGHTS RESERVED
F1-Help F2-Stamp F3-Print_Pg F4-Print F5-Other F6-Del F7-Archive PgUp/PgDown
10/27/93 10:00 OPR DMS↑ PR↑ TK↓ HC↑ DB↑ XB↑ WL↓ HWL↓ QC↑ 56

The Action Log provides a record of maintenance and troubleshooting procedures and comments. It is convenient for Quality Assurance documentation.

The function keys available are:

**F1 Help**

**F2 Stamp** Adds date, time, operator ID and instrument serial number to each entry.

**F3 Print Pg** Saves and prints the page that appears on the screen.

**F4 Print** Saves and prints the entire Action Log.

**F5 Other** Brings up the same options available from the Main Menu.

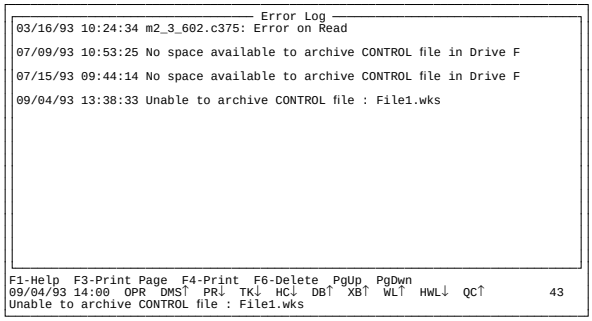
**F6 Del** Deletes the entire Action Log and prints it. **This action is irreversible.**

**F7 Archive** Saves and downloads the Action Log to a floppy disk.

**PgUp** and **PgDn**
Move to new pages of the Action Log and save any changes made to the page before.


PN 4237188A (December 1993)

# ERROR LOG


Error Log
03/16/93 10:24:34 m2_3_602.c375: Error on Read
07/09/93 10:53:25 No space available to archive CONTROL file in Drive F
07/15/93 09:44:14 No space available to archive CONTROL file in Drive F
09/04/93 13:38:33 Unable to archive CONTROL file : File1.wks
F1-Help F3-Print Page F4-Print F6-Delete PgUp PgDwn
09/04/93 14:00 OPR DMS↑ PR↓ TK↓ HC↓ DB↑ XB↑ WL↑ HWL↓ QC↑ 43
Unable to archive CONTROL file : File1.wks

When an error message occurs on the DMS, it is recorded in the Error Log. When you run a batch of samples, you can use the Error Log to see which ones have error messages for:

- Sample Id
- Partial aspiration
- Collate failed.

To view the Error Log, from the Main Menu, press **F3**.

Function keys available:

**F1 Help**

**F3 Print Page**
Prints one screen of Error Log.

**F4 Print** Prints entire contents of Error Log.

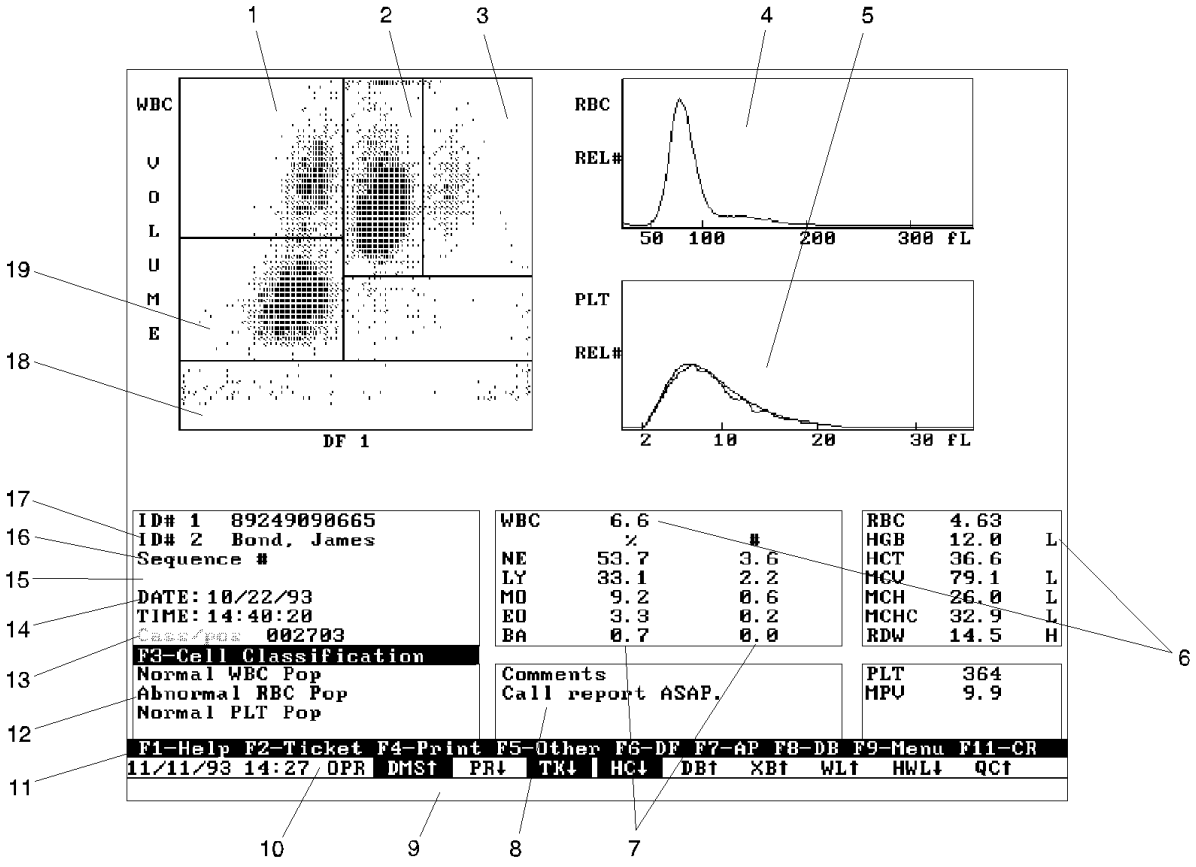
**F6 Delete** Delete Error Log.

**PgUp** and **PgDn**
Display previous/next screen of Error Log.

### Sample Analysis
### Run Samples

The DMS screen displays the sample results. The display includes scatterplot, histograms, parameter data, and flagging codes and messages as they apply.

This example shows the CBC and Diff results.




1. MO POPULATION
2. NE POPULATION
3. EO POPULATION
4. RBC HISTOGRAM
5. PLT HISTOGRAM
6. CBC PARAMETER RESULTS
7. DIFF RESULTS, PERCENT AND NUMBER
8. COMMENT WINDOW
9. F8-DB OPTIONS
10. STATUS LINE
11. OPTION LINE
12. POPULATION CONDITION WINDOW
13. CASSETTE AND POSITION
14. DATE AND TIME SAMPLE WAS ANALYZED
15. STATUS MESSAGE (WHEN ONE OCCURS)
16. SEQUENCE NUMBER
17. TWO SAMPLE IDENTIFICATION FIELDS
18. WBC THRESHOLD
19. LY POPULATION

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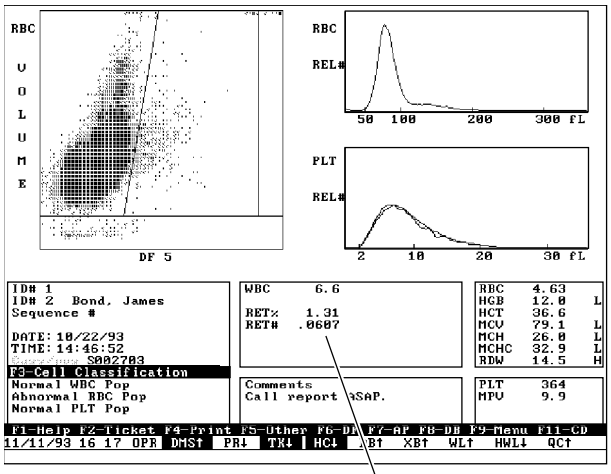


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On a collated sample, press **F11** **CR** to view the CBC and Retic results.

Press **F11** **CD** to view the CBC and Diff results again.

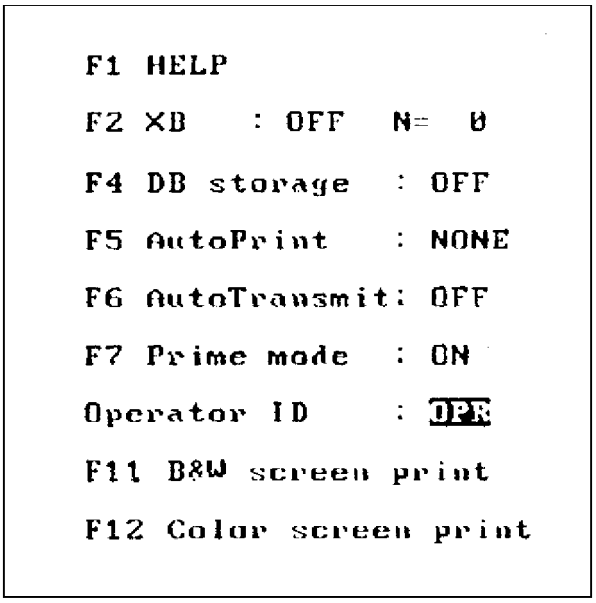
Function keys available:

**F1** **Help** Provides additional information about the Sample Analysis screen.

**F2** **Ticket** Generates a ticket printout. The AutoReporter 3 does not print Retic results.

**F3** **Cell Classification**
Turns on and off the window that displays the Suspect and Definitive flags. When you turn it off, it stays off for succeeding samples also. However, if the Suspect and Definitive flag options in Printer Definition are set to Yes, the Graphic Printer prints the messages even though the window does not appear on the display. F3 is not listed with the other options; it is available only if there is an abnormal WBC, RBC or Plt population message.

**F4** **Print** Generates a Graphic Printer printout. Can include graphs, histograms and data as set in Special Functions.


F1 HELP
F2 XB : OFF N= 0
F4 DB storage : OFF
F5 AutoPrint : NONE
F6 AutoTransmit: OFF
F7 Prime mode : ON
Operator ID : OPR
F11 B&W screen print
F12 Color screen print

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**F5 Other** Use this option to set the conditions that appear in the Status line. When you press F5, another window appears; it includes:

**F1 Help** Provides additional information about this window.

**F2 XB** Turns $\bar{X}_B$ Analysis on and off. Also displays the number of samples run so far in the current batch, and indicates whether the last completed $\bar{X}_B$ batch is in or out.

**F4 DB Storage**
Turns Data Base Storage on and off.

**F5 AutoPrint**
Sets automatic printing of the Graphic Printer to:

OFF:
NONE - prints no results.

ON:
ALL - prints all results.
ABNORMALS - prints only samples with flagged results.
NORMALS - prints only samples with no flags.
Default setting is NONE.

Applies to:
- Run Samples
- Start Up
- Reproducibility

Does not print Control Run or Calibration results.

**IMPORTANT**

**When F5 AutoPrint is ON (set to ALL, ABNORMALS or NORMALS) and PR↑ appears on the Status line, these options are not functional:**

**F11 B&W Screen Print**
**F12 Color Screen Print**

**F5 Other** (continued)

**F6 AutoTransmit**
Turns automatic transmission to host computer on and off. Applies to Sample Analysis and Controls.

**F7 Prime mode**
Sets the system to Prime mode ON/OFF. When you set Prime mode to ON, the $\bar{X}_B$, DB, and AutoTransmit automatically turn off.

**Operator ID** Use to enter a three-character operator identification.

**F11 B&W screen print**
Sets the Graphic Printer to print Run Samples screen in large black and white.

**F12 Color screen print**
Sets the Graphic Printer to print Run Samples display in large color.

**F6 DF** Use to look at other views of the scatterplot: DF2 and DF3 for Diff, DF6 for Retics, and the VCS histograms.

**F7 AP** Use to look at single aperture data for CBC parameters.

**F8 DB** Use to look at samples stored in the Data Base.

**F9 Menu** Returns display directly to the Main Menu.

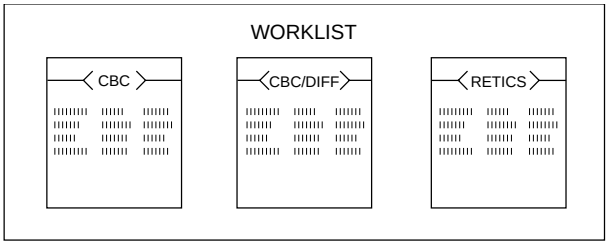
**F11 CD or CR**
Use to toggle between CBC/DIFF results and CBC/RETIC results on a collated sample.

This chapter includes:


Worklist Description
When You Preassign the Worklist
Required Positive Identifiers
Setting up Positive and Optional Identifiers
Setting up Physician and Location Lists
Auto Sequencing on the Worklist
To Add an Entry to the Worklist
To Edit a Worklist entry
Worklist status: Collate Failed
When You do Not Preassign the Worklist
    Primary Mode
    Secondary Mode
NO READ, NO MATCH, MISMATCH
Host Worklist


## WORKLIST DESCRIPTION

### Sample Analysis Worklist

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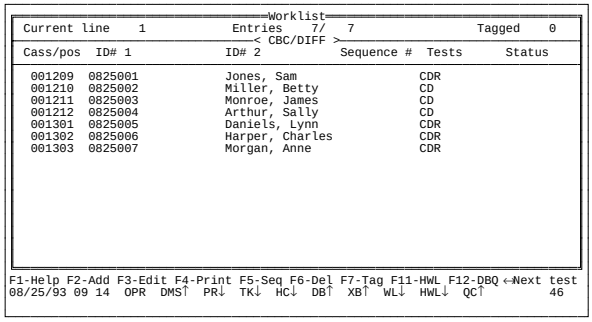

Worklist
Current line 1 Entries 7/ 7 Tagged 0
< CBC/DIFF >
Cass/pos ID# 1 ID# 2 Sequence # Tests Status
001209 0825001 Jones, Sam CDR
001210 0825002 Miller, Betty CD
001211 0825003 Monroe, James CD
001212 0825004 Arthur, Sally CD
001301 0825005 Daniels, Lynn CDR
001302 0825006 Harper, Charles CDR
001303 0825007 Morgan, Anne CDR
F1-Help F2-Add F3-Edit F4-Print F5-Seq F6-Del F7-Tag F11-HWL F12-DBQ ↵Next test
08/25/93 09 14 OPR DMS↑ PR↓ TK↓ HC↓ DB↑ XB↑ WL↓ HWL↓ QC↑ 46

The Worklist is a list of samples that have not been processed. When you assign samples to the Worklist, you do so by profile. A profile is a test or combination of tests to be performed. The Worklist keeps a separate list for each test:

- CBC
- CBC/DIFF
- RETIC

You can use the Worklist to preassign from 100 to 1000 patients, depending upon the size of the Worklist as set in Special Functions.

Function keys available:

**F1 Help**

**F2 Add** Opens a window where you can preassign samples to the Worklist.

**F3 Edit** Change or add to existing data for a sample.

| | |
|---|---|
| F4 **Print** | Print entries that are tagged on Worklist screen displayed. |
| Alt F4 | Print all tests for the entries tagged on Worklist screen displayed. Key strokes active, but not seen on screen. |
| F5 **Seq** | Set automatic sequencing ON/OFF. |
| F6 **Del** | Delete entries that are tagged on Worklist. |
| F7 **Tag** | Tag or untag individual entries on Worklist. |
| Alt F7 | Tag or untag all entries on Worklist. Key strokes active, but not seen on screen. |
| F11 **HWL** | Go to Host Worklist. |
| F12 **DbQ** | Go to Data Base Query. |
| ← or → **Next Test** | Go to the Worklist for the next test. |

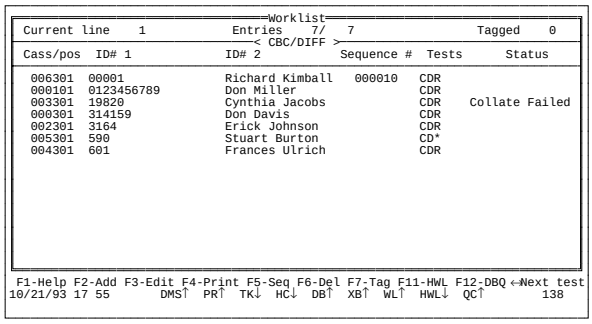
## WHEN YOU PREASSIGN THE WORKLIST

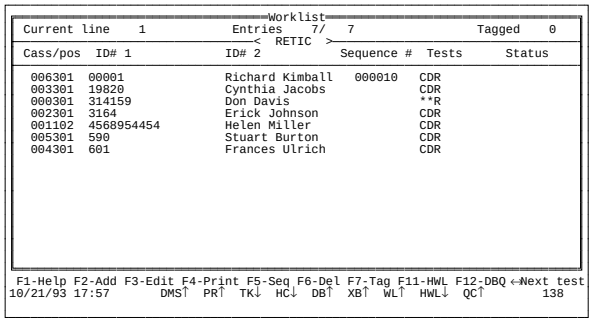
When you preassign a sample, you select a profile and enter sample identification for each test.

The Worklist is test type oriented. When a sample is analyzed for a specific test, its positive identifier is checked against the Worklist for that test type. When the system finds a match, the sample ID and results are stored in the data base.

When the system does not find a match, a *NO MATCH* message is generated. However, if there are no tests preassigned in the Worklist for the test type being analyzed, the system does not compare the sample to the Worklist, but sends it

directly to the Data Base. This situation does not generate a *NO MATCH* message.


Worklist
Current line 1 Entries 7/ 7 Tagged 0
< CBC/DIFF >
Cass/pos ID# 1 ID# 2 Sequence # Tests Status
006301 00001 Richard Kimball 000010 CDR
000101 0123456789 Don Miller CDR
003301 19820 Cynthia Jacobs CDR Collate Failed
000301 314159 Don Davis CDR
002301 3164 Erick Johnson CDR
005301 590 Stuart Burton CD*
004301 601 Frances Ulrich CDR
F1-Help F2-Add F3-Edit F4-Print F5-Seq F6-Del F7-Tag F11-HWL F12-DBQ ←Next test
10/21/93 17 55 DMS↑ PR↑ TK↓ HC↓ DB↑ XB↑ WL↑ HWL↓ QC↑ 138


Worklist
Current line 1 Entries 7/ 7 Tagged 0
< RETIC >
Cass/pos ID# 1 ID# 2 Sequence # Tests Status
006301 00001 Richard Kimball 000010 CDR
003301 19820 Cynthia Jacobs CDR
000301 314159 Don Davis **R
002301 3164 Erick Johnson CDR
001102 4568954454 Helen Miller CDR
005301 590 Stuart Burton CDR
004301 601 Frances Ulrich CDR
F1-Help F2-Add F3-Edit F4-Print F5-Seq F6-Del F7-Tag F11-HWL F12-DBQ ←Next test
10/21/93 17:57 DMS↑ PR↑ TK↓ HC↓ DB↑ XB↑ WL↑ HWL↓ QC↑ 138

After each test is successfully completed, it is removed from the Worklist for that test. If other tests for that sample have not yet been run, the sample entry remains on the Worklist of the pending test. As tests assigned in a profile are matched and removed from their list, the test letter designator is replaced by an asterisk (*) in the Worklist for the test not yet run. In these examples, on the CBC/DIFF list, the Retic test for Stuart Burton has been completed. On the Retic list, the CBC/DIFF test for Don Davis has been completed. After all tests are complete, if you have preassigned a CBC/DIFF/RETIC profile, the results of the separate tests are collated.

You can preassign the Worklist while samples are being cycled.

## REQUIRED POSITIVE IDENTIFIERS

The Positive Identifier has been defined in Setup. You must enter the proper identifier(s) on the Worklist. Samples run in the Secondary mode can be identified by either Cass/Pos or ID# 1 regardless of Positive Identifier. Here is a summary of what needs to be entered.

| Positive Identifier | Primary Mode | Secondary Mode |
|---|---|---|
| Cass/Pos only | Cass/Pos | Cass/Pos or ID# 1 |
| ID# 1 only | ID# 1 | Cass/Pos or ID# 1 |
| Cass/Pos + ID# 1 | Cass/Pos + ID# 1 | Cass/Pos or ID# 1 |

The Positive Identifier appears in green on the Run Samples display, and is underlined on the Graphic Printer printout.

If the system is set for a single Positive Identifier (Cass/Pos **or** ID#1), and you preassign both IDs, it checks for both. If it does not find a match for the non-Positive Identifier, it generates an *ID MISMATCH* message.

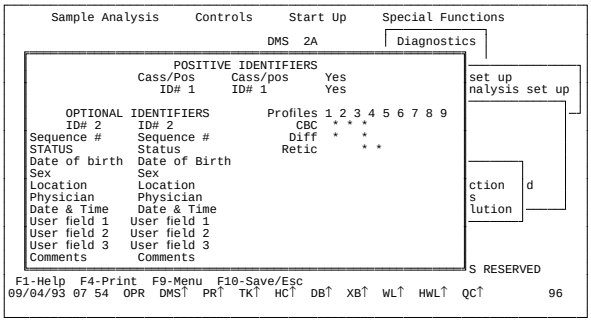
## SETTING UP POSITIVE AND OPTIONAL IDENTIFIERS

**IMPORTANT**

**There must be no data in the Data Base, the Worklist, or the Host Worklist when you set up or change any identifier.**

When you set up or change any of the identifiers, there must be no data in the Data Base, the Worklist, or the Host Worklist. To set up the identifiers for both Primary and Secondary modes, go to the Screen labels mode.

**Special Functions**
**Set up**
**Sample Analysis set up**
**Display formats**
**Screen labels**


Sample Analysis Controls Start Up Special Functions
DMS 2A
Diagnostics
POSITIVE IDENTIFIERS
Cass/Pos Cass/pos Yes
ID# 1 ID# 1 Yes
OPTIONAL IDENTIFIERS
ID# 2 ID# 2
Sequence # Sequence #
STATUS Status
Date of birth Date of Birth
Sex Sex
Location Location
Physician Physician
Date & Time Date & Time
User field 1 User field 1
User field 2 User field 2
User field 3 User field 3
Comments Comments
Profiles 1 2 3 4 5 6 7 8 9
CBC * * *
Diff * *
Retic * *
F1-Help F4-Print F9-Menu F10-Save/Esc
09/04/93 07 54 OPR DMS↑ PR↑ TK↑ HC↑ DB↑ XB↑ WL↑ HWL↑ QC↑ 96

You **must** select at least one Positive Identifier. Your choices for Positive Identifier are:

Cass/Pos (cassette and position)
ID#1

You must set at least one of these fields to Yes; you can select both.

This is also where you set up your Profile options. A profile defines which tests will be run on a sample. The default settings are:

Profile 1 - CBC and Diff
Profile 2 - CBC only
Profile 3 - CBC, Diff and Retic
Profile 4 - Retic only

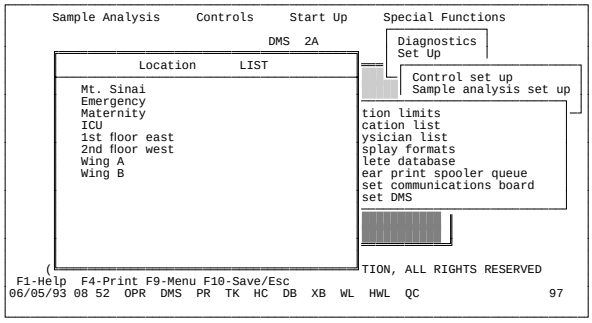
For best operation, use the default profile settings. You can change the profile order, but you **must** use the four profile types listed.

You can also set up a group of optional identifiers. The default options are: ID#2, Sequence number, Status, Date of birth, Sex, Location, Physician, Date and Time, User field 1, User field 2, User field 3, and Comments.

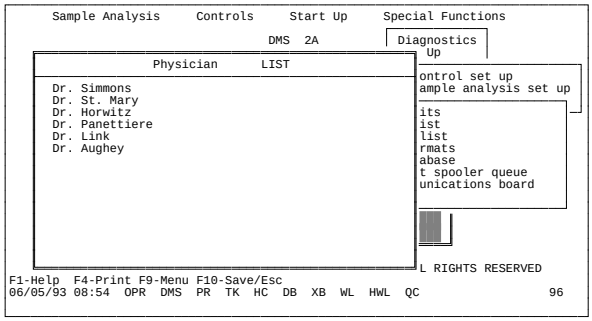
You can change any of these labels to suit your laboratory's use. The labels set in this mode determine the field names that appear on the Sample Analysis, Worklist, Host Worklist and Data Base displays. Place the cursor on that field and type in the new label; use **F1 Help** to find the number of characters available for each field.

## SETTING UP LOCATION AND PHYSICIAN LISTS

**Special Functions**
**Set Up**
**Sample Analysis Set Up**
**Location list/Physician list**



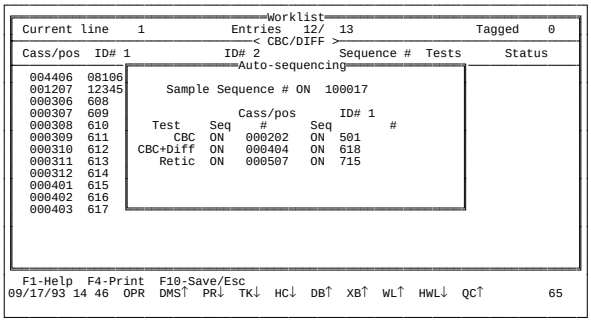

On the Location List set up there are 30 fields of 16 characters each.




On the Physician List set up there are 30 fields of 22 characters each.

You can call up these lists from the Worklist Preassignment window, the Worklist Edit window, or the data base, and select an entry for the current sample. You can add to or remove from this list at any time.

# AUTOMATIC SEQUENCING ON THE WORKLIST




When you go to the Worklist, there are three fields you can set to sequence automatically:

**Cass/Pos**
**ID#1**
**Sequence #**

To go to the Worklist Auto-sequencing window,

press F5 **Seq**

- directly from the Worklist
- or from the Sample preassignment window (WL, F2 **Add**)
- or from the Sample editing window (WL, F3 **Edit**)

Here you can set to ON/OFF and enter numbers for:

**Sample sequence**
**Cass/pos**
**ID# 1**

Cass/pos and ID# 1 can have separate sequence numbers for each test. Enter starting sequence number for each Auto-sequencing field set to ON.

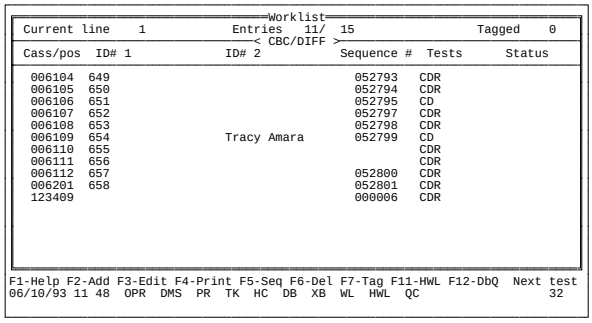
When you enter the ID# 1 sequence number, you must enter the same number of digits as there are on your bar-code labels, including leading zeros. The system uses the same number of digits in its sequencing and includes leading zeros as required.

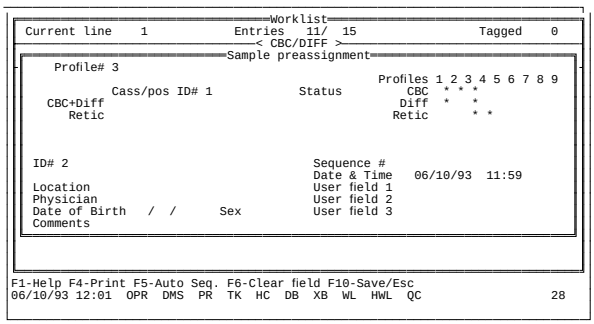
When you make an entry in this window, press F10 to save it and return to the Worklist.

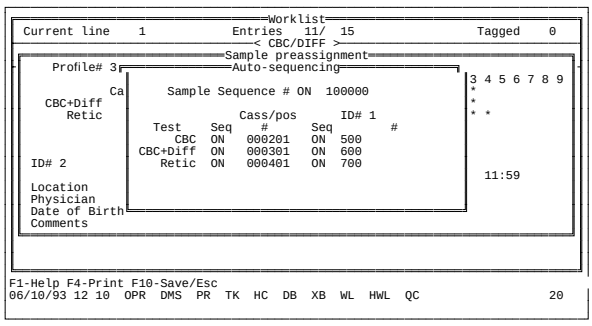
When you want to set or change any of the numbers that sequence automatically, place the cursor in the appropriate field and type in the new sequence number. The system picks up at the newly set number and begins the sequence from there.

## TO ADD AN ENTRY TO THE WORKLIST:

### Sample Analysis Worklist





Worklist
Current line 1 Entries 11/ 15 Tagged 0
< CBC/DIFF >
Sample preassignment
Profile# 3
Profiles 1 2 3 4 5 6 7 8 9
Cass/pos ID# 1 Status CBC * * *
CBC+Diff Diff * *
Retic Retic * *
ID# 2 Sequence #
Date & Time 06/10/93 11:59
Location User field 1
Physician User field 2
Date of Birth / / Sex User field 3
Comments
F1-Help F4-Print F5-Auto Seq. F6-Clear field F10-Save/Esc
06/10/93 12:01 OPR DMS PR TK HC DB XB WL HWL QC 28


Worklist
Current line 1 Entries 11/ 15 Tagged 0
< CBC/DIFF >
Sample preassignment
Auto-sequencing
Sample Sequence # ON 100000
Cass/pos ID# 1
Test Seq # Seq #
CBC ON 000201 ON 500
CBC+Diff ON 000301 ON 600
Retic ON 000401 ON 700
F1-Help F4-Print F10-Save/Esc
06/10/93 12 10 OPR DMS PR TK HC DB XB WL HWL QC 20

1. Press **F2 Add**. The screen changes to the Sample Preassignment window, with current date and time entered.

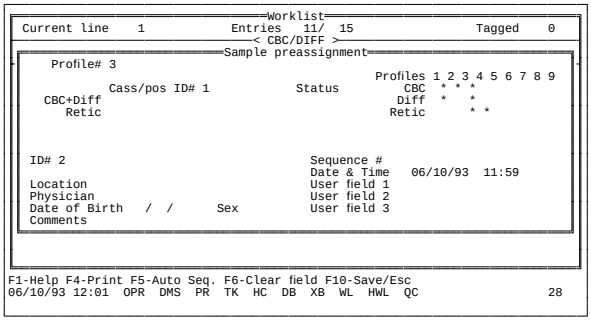
2. The cursor is in the Profile field. Select profile of tests you plan to run on this sample. Enter Profile number.

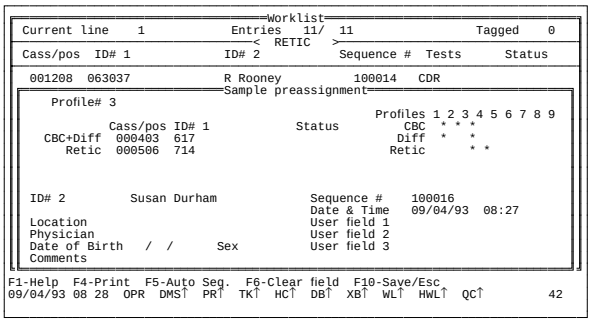
   1 for CBC and Diff
   2 for CBC only
   3 for CBC, Diff and Retic
   4 for Retic only

   When you enter the profile number, tests in that profile are listed under the identifier labels, and the cursor moves to the first identifier field.

3. If you want to use Autosequencing, press **F5 Auto Seq.** Screen changes to Auto-sequencing window. Check settings; set or reset as needed. Options are:

   - Turn Auto-sequencing ON/OFF. Use **space bar** to toggle.
   - For each autosequencing field turned on, enter a starting sequence number.


Worklist
Current line 1 Entries 11/ 15 Tagged 0
< CBC/DIFF >
Sample preassignment
Profile# 3
Profiles 1 2 3 4 5 6 7 8 9
Cass/pos ID# 1 Status CBC * * *
CBC+Diff Diff * *
Retic Retic * *
ID# 2 Sequence #
Date & Time 06/10/93 11:59
Location User field 1
Physician User field 2
Date of Birth / / Sex User field 3
Comments
F1-Help F4-Print F5-Auto Seq. F6-Clear field F10-Save/Esc
06/10/93 12:01 OPR DMS PR TK HC DB XB WL HWL QC 28


Worklist
Current line 1 Entries 11/ 11 Tagged 0
< RETIC >
Cass/pos ID# 1 ID# 2 Sequence # Tests Status
001208 063037 R Rooney 100014 CDR
Sample preassignment
Profile# 3
Profiles 1 2 3 4 5 6 7 8 9
Cass/pos ID# 1 Status CBC * * *
CBC+Diff 000403 617 Diff * *
Retic 000506 714 Retic * *
ID# 2 Susan Durham Sequence # 100016
Date & Time 09/04/93 08:27
Location User field 1
Physician User field 2
Date of Birth / / Sex User field 3
Comments
F1-Help F4-Print F5-Auto Seq. F6-Clear field F10-Save/Esc
09/04/93 08 28 OPR DMS↑ PR↑ TK↑ HC↑ DB↑ XB↑ WL↑ HWL↑ QC↑ 42

- Change any sequence number. Auto-sequencing starts with new number.

Press **F10** to save your entries and return to Sample preassignment window.

4. Enter ID numbers. You must enter either a Cass/Pos or ID# 1 for each test. You can either:

   a. If not using autosequencing, enter ID numbers manually (ID#1 must be 3 to 16 characters) on the DMS keyboard, or

   b. If Auto-sequencing is on,

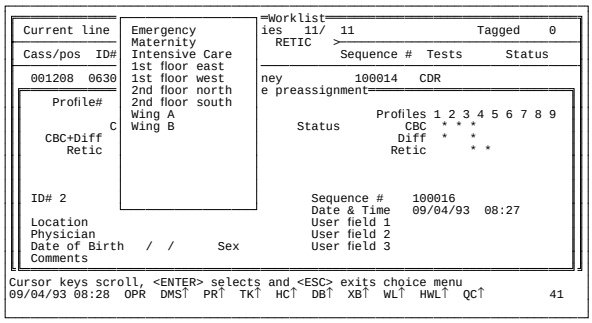
      - you can press **Enter** to put the next sequence number into an individual field, or
      - if you have finished with this entry, press **PgDn** to go to a new Sample preassignment window, or
      - if you want to add more sample information, go on to next step.

5. You can enter up to 16 characters in the ID#2 field as an optional identifier.

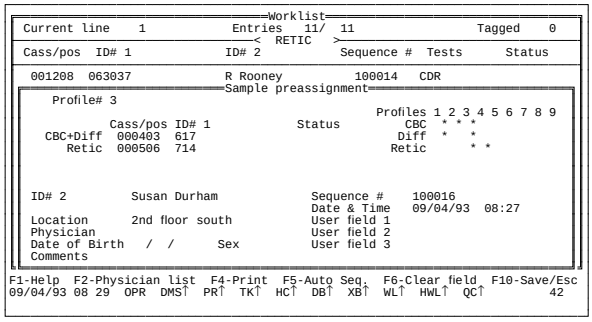
6. You can manually enter a sequence number or use auto-sequencing.

7. To enter a location, place the cursor in the Location field. You can either

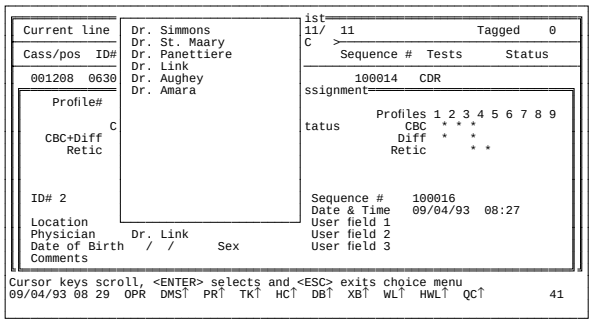
   - enter a location manually or




- press **F2** for the Location list. Move the cursor to the location you want and press **Enter**.




Your selection is entered in the Location field.

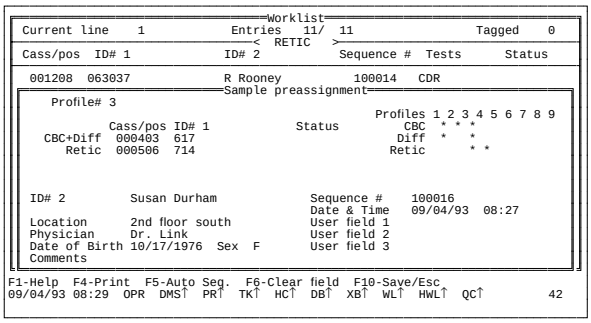



8. To enter a physician, place the cursor in the Physician field. You can either

   - enter a physician's name manually or
   - press **F2** for the Physician list. Move the cursor to the name you want and press **Enter**. Your selection is entered in the Physician field.

9. To enter a date of birth, use the format: MM/DD/YYYY.

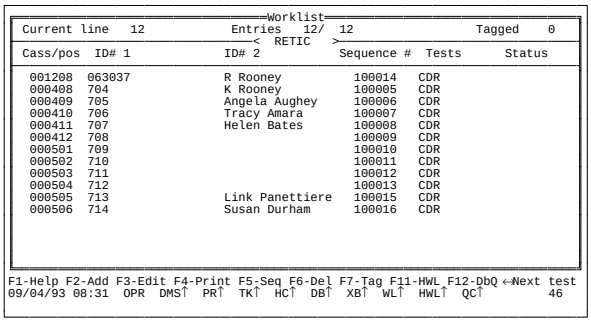
10. Choices for Sex field are M(ale), F(emale), O(ther), or U(nknown).


Worklist
Current line 1 Entries 11/ 11 Tagged 0
< RETIC >
Cass/pos ID# 1 ID# 2 Sequence # Tests Status
001208 063037 R Rooney 100014 CDR
Sample preassignment
Profile# 3
Profiles 1 2 3 4 5 6 7 8 9
Cass/pos ID# 1 Status CBC * * *
CBC+Diff 000403 617 Diff * *
Retic 000506 714 Retic * *
ID# 2 Susan Durham Sequence # 100016
Date & Time 09/04/93 08:27
Location 2nd floor south User field 1
Physician Dr. Link User field 2
Date of Birth 10/17/1976 Sex F User field 3
Comments
F1-Help F4-Print F5-Auto Seq. F6-Clear field F10-Save/Esc
09/04/93 08:29 OPR DMS↑ PR↑ TK↑ HC↑ DB↑ XB↑ WL↑ HWL↑ QC↑ 42

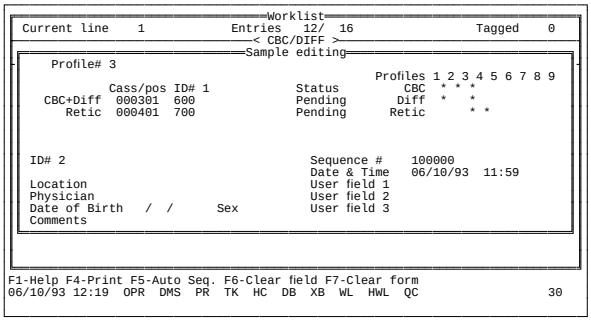
11. Enter any other patient identification data, including comments, then

    - press **PgDn** to save and go to a blank preassign screen, or
    - press **F10** to save your entries and return to the Worklist.

    Your entry appears on the list for each test in the selected profile.


Worklist
Current line 12 Entries 12/ 12 Tagged 0
< RETIC >
Cass/pos ID# 1 ID# 2 Sequence # Tests Status
001208 063037 R Rooney 100014 CDR
000408 704 K Rooney 100005 CDR
000409 705 Angela Aughey 100006 CDR
000410 706 Tracy Amara 100007 CDR
000411 707 Helen Bates 100008 CDR
000412 708 100009 CDR
000501 709 100010 CDR
000502 710 100011 CDR
000503 711 100012 CDR
000504 712 100013 CDR
000505 713 Link Panettiere 100015 CDR
000506 714 Susan Durham 100016 CDR
F1-Help F2-Add F3-Edit F4-Print F5-Seq F6-Del F7-Tag F11-HWL F12-DbQ ←Next test
09/04/93 08:31 OPR DMS↑ PR↑ TK↑ HC↑ DB↑ XB↑ WL↑ HWL↑ QC↑ 46

## TO EDIT A WORKLIST ENTRY


Worklist
Current line 1 Entries 12/ 16 Tagged 0
< CBC/DIFF >
Sample editing
Profile# 3
Profiles 1 2 3 4 5 6 7 8 9
Cass/pos ID# 1 Status CBC * * *
CBC+Diff 000301 600 Pending Diff * *
Retic 000401 700 Pending Retic * *
ID# 2 Sequence # 100000
Date & Time 06/10/93 11:59
Location User field 1
Physician User field 2
Date of Birth / / Sex User field 3
Comments
F1-Help F4-Print F5-Auto Seq. F6-Clear field F7-Clear form
06/10/93 12:19 OPR DMS PR TK HC DB XB WL HWL QC 30

You can edit any pending data in the Worklist. Move the cursor to the sample on the Worklist and press **F3** **Edit**.

- If a test has been run, the status field shows Completed.
- If the test has not been run yet, the status field shows Pending.

You can change any data on the screen except the identifiers for a test that has been completed. You can add or change demographics. You have the same options as you did with the Add feature.

You can use **PgUp** and **PgDn** to scoll through entries within a specific test. If you have modified an entry, **PgDn** saves the changes; **PgUp** discards changes.

# WORKLIST STATUS: COLLATE FAILED AND PARTIAL ASPIRATION

*COLLATE FAILED*

If a collate failure occurs:

- A *COLLATE FAILED* message appears in the Worklist Status field and in the Run Samples status field.
- The test that failed collation is saved to Data Base as a separate entry.
- The entry remains on the Worklist and is still a candidate for matching and collation. The *COLLATE FAILED* message reminds you that the sample has been run before.
- A collate failure message is posted to the Error Log. See the Special Procedures and Troubleshooting manual, PN 4237187, for Collate Failure messages.

*PART. ASP*

The system detected a partial aspiration.

- *PARTIAL ASP* is posted in the Worklist Status field if the sample has been preassigned.
- *PART.ASP* appears in the Sample status field.
- If preassigned, the entry remains on the Worklist, and is still a candidate for matching. The *PART. ASP* message reminds the operator that the sample has been run before.
- The sample is saved to the data base as a separate entry. Dots (.....) appear in all parameter fields.
- If Autoprint is ON (that is, set to ALL, NORMALS or ABNORMALS), the Graphic Printer prints the sample identification and the *PART.ASP* message. Parameter labels and data do not print.

- The Ticket printout is not automatically printed.

- The results are not automatically transmitted to the Host computer if the PART.ASP/NO READ option is set to NO. However, if the PART.ASP/NO READ option is set to YES, and if AutoTransmit is on, and a PART.ASP occurs, then the system transmits all sample information, including identifiers, the *Partial Aspiration* message and dots (.....) for the parameter results to the host computer.

- A *PART. ASP* message is posted to the Error Log.

  Example: "PART. ASP: aspiration error on sample (<Cass/Pos>, <ID# 1>)."

If a total of 10 non-consecutive PART.ASP, NO MATCH and NO READ messages accumulates, the Analyzer stops, unless the 11th sample has already been scanned and is being processed.

## NO READ, NO MATCH, ID MISMATCH

In any situation, if the bar-code reader does not read the Cass/pos number:

- No data is sent to the DMS.

- A *LABEL NOT READ* message appears on the Diluter, the system stops, and an alarm sounds.

Some situations that occur during processing cause a message to appear in the Error Log. The messages, their causes and results are:

*NO READ*

ID#1 is a Positive Identifier and the bar-code reader could not read the tube label.

If a *NO READ* occurs:

- A *NO READ* message is posted to the Error Log.

  Example: "NO READ: Sample run received without proper identification. (<Cass/Pos>, <ID# 1>)."

- Dashes (-----) appear in the ID#1 field.

- The sample is saved to the data base with dots (.....) in all parameter fields.

- The *NO READ* message appears in the Sample Status field.

- If Autoprint is ON (that is, set to ALL, NORMALS or ABNORMALS), the Graphic Printer prints the sample identification other than tube number and the *NO READ* message. Parameter labels and data do not print.

- The Ticket printout is not automatically printed.

- Results are not automatically transmitted to the host computer if the PART.ASP/NO READ option is set to NO. However, if the PART.ASP/NO READ option is set to YES, and if AutoTransmit is on, and a PART.ASP occurs, then the system transmits all sample information, including identifiers, the *Partial Aspiration* message and dots (.....) for the parameter results to the host computer.

If three consecutive NO READs or 10 nonconsecutive NO READ, NO MATCH and PART.ASPs occur, the system stops.

*NO MATCH*

There are entries for the test on the Worklist, but the processed sample's Positive identifier did not match any entry in the Worklist.

- The sample is saved to the data base with a *NO MATCH* message in the status field.

- A *NO MATCH* message is posted to the Error Log.

Example: "NO MATCH: Sample run received does not match any Worklist entry (<Cass/Pos>, <ID# 1>)."

- If Autoprint is ON (that is, set to ALL, NORMALS or ABNORMALS), the Graphic Printer prints the sample identification and the *NO MATCH* message. Parameter labels and data do not print.
- The Ticket printout is not automatically printed.
- Results are not automatically transmitted to the host computer.

After three consecutive *NO MATCH* messages, or 10 nonconsecutive NO MATCH, NO READ and PART.ASPs, the system stops.

It is possible for four consecutive *NO READ* or *NO MATCH* messages to occur. This can happen because of the timing of the throughput. The system sends the signal to stop when the third message occurs, but the fourth sample has already been scanned and is in process.

*ID MISMATCH*

The Positive Identifier is Cass/Pos only, and the system reads a tube number that does not match the ID# 1 entered on the Worklist. This could mean the tube was misplaced in the cassette.

or

The Positive Identifier is ID# 1 only, and the system reads a Cass/Pos that does not match the Cass/Pos entered on the Worklist.

- The Sample Status field displays the *ID MISMATCH* message.
- An *ID MISMATCH* message is posted to the Error Log.

  Example: "Warning: MISMATCH on non primary ID (<ID received>)."
- The sample is saved to the data base. The Edit DB Sample screen displays the *ID MISMATCH* message in the Status field.
- The sample report and the transmission to the host computer for the sample includes both IDs: the preassigned one and the one read by the Analyzer.

- Sample results and identifiers can be edited in Data Base Query.

## Message Summary

The priority of messages in the Worklist and Data Base is as follows:

| Data Base Query Flags field | Data Base Status field | Worklist Status field |
|---|---|---|
| *No Read* | *No Read* | |
| *No Match* | *No Match* | |
| *Partial Aspiration* | *Partial Aspiration* | *Partial Aspiration* |
| *Collate Failed* | *Collate Failed* | *Collate Failed* |
| *Flag* | | |

When a single error condition occurs, the appropriate error message is posted to the Error Log.

If any of these combinations of error messages occur, both messages are posted to the Error Log:

- *Partial Aspiration* and *No Match*
- *Partial Aspiration* and *ID Mismatch*
- *ID Mismatch* and *Collate Failed*

## To Resume Operations

If three consecutive NO READs, three consecutive NO MATCHs, or 10 accumulated NO READ, NO MATCH and PART.ASPs occur,

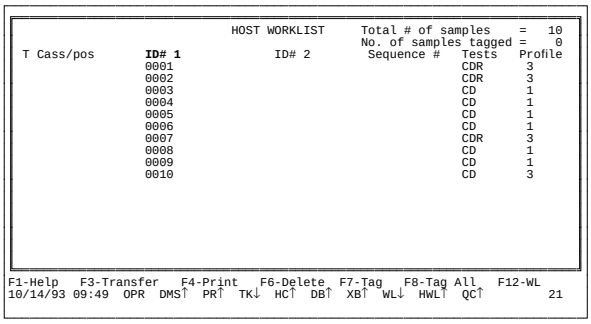
- WL on the Status line turns red
- Alarm sounds
- The system stops.
- *Check DMS Status* message appears on Analyzer CRT.

To acknowledge a system stop error, you must press Alt Esc. This posts a message to the Error Log line and allows the Analyzer to run.

The error posted to the Error Log might be: "Operator acknowledged Worklist system stop errors."

Press **Alt** **Esc** again to clear the error line.

## HOST WORKLIST




If your system is connected to a host computer, you can transfer sample identification data from the host to the DMS Host Worklist. This is an example of a Host Worklist printout. The Host Worklist can hold identifiers for 1000 samples. From the Host Worklist, the operator can tag samples and transfer them to the Worklist. The Worklist can accept from the Host Worklist identifiers for samples up to the capacity set for the Worklist.

This chapter includes:

Data Base Query
Data Base Sorting
Edit Data Base Sample
Reorder Patient
Edit Profile/Demographics
Collating
Data Base Batch Processing
Archiving from Data Base
Delete Data Base

## DATA BASE QUERY

**Sample Analysis**
**Data Base Query**

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**IMPORTANT**

**Do not cycle the instrument while batch processing. If you do, the instrument stops, and you must rerun the last sample.**

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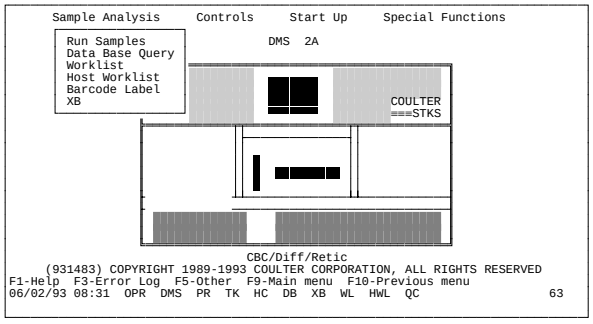
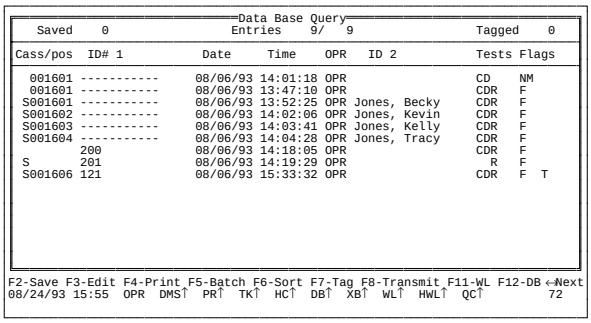



Data Base Query allows manipulation of the data base.

Use this option to review samples stored in the data base. The data base stores from 500 to 5000 patient results depending upon the setting in Special Functions. After the maximum number of samples, wraparound occurs and the oldest (determined by time of last test analyzed in a profile) samples that have not been marked to save are overwritten. Samples with pending test results are not overwritten.


Data Base Query
Saved 0
Entries 9/ 9
Tagged 0
Cass/pos ID# 1 Date Time OPR ID 2 Tests Flags
001601 ---------- 08/06/93 14:01:18 OPR CD NM
001601 ---------- 08/06/93 13:47:10 OPR CDR F
S001601 ---------- 08/06/93 13:52:25 OPR Jones, Becky CDR F
S001602 ---------- 08/06/93 14:02:06 OPR Jones, Kevin CDR F
S001603 ---------- 08/06/93 14:03:41 OPR Jones, Kelly CDR F
S001604 ---------- 08/06/93 14:04:28 OPR Jones, Tracy CDR F
200 08/06/93 14:18:05 OPR CDR F
S 201 08/06/93 14:19:29 OPR R F
S001606 121 08/06/93 15:33:32 OPR CDR F T
F2-Save F3-Edit F4-Print F5-Batch F6-Sort F7-Tag F8-Transmit F11-WL F12-DB ←Next
08/24/93 15:55 OPR DMS↑ PR↑ TK↑ HC↑ DB↑ XB↑ WL↑ HWL↑ QC↑ 72

When you access this option, you see what was selected by the last Sort criteria. To review other samples, change the Sort criteria. If the last sorting process resulted in no entries displayed here, then when you access this option, the sort window appears.

The top of the screen shows you, from left to right:

- How many entries are marked to save at wraparound
- How many entries have been selected for sorting
- How many entries there are in the data base
- How many entries are tagged for batch processing

Each data line has fields for the following information about a sample:

- A pointer character if the sample is tagged
- Positive ID number(s): Cass/Pos and/or ID#1. An S in the far left position of Cass/Pos field indicates the sample was cycled in the Secondary mode.
- Date and time of cycle
- The operator code at time of cycle
- The secondary identifier, if one has been entered, for example, a name.
- Which tests have been completed for the sample:
  C = CBC
  D = Diff
  R = Retic

- Flags field:
  Blank means not flagged
  F means flagged

  These symbols also appear in the Flags field:
  NM means NO MATCH
  NR means NO READ
  CF means COLLATE FAILED
  PA means Partial Aspiration

- Output:
  A = Archive
  P = Batch Print
  H = Host
  S = Save
  T = Ticket

Function keys available:

| | |
|---|---|
| F1 **Help** | Help |
| F2 **Save** | Mark a sample to be saved from being overwritten when wraparound occurs. Place the cursor on the sample to be saved, and press this key. If you press the key again, or if the sample is already saved, it unsaves. You can save up to 150 samples. |
| Alt F2 | Goes directly to Reorder Patient window instead of going to F3 **Edit** first. Key strokes active, but not seen on screen. |
| F3 **Edit** | Shows sample data from the Run Samples display, except the graphics, for the line the cursor is on. You can edit data here; see Data Base Query, Edit. To edit Profile or demographics, press F3 again. |

**Alt** **F3** Goes directly to Edit demog./ profile window instead of going to **F3** **Edit** first. Key strokes active, but not seen on screen.

**F4** **Print** Print sorted entries displayed on the Data Base Query screen.

**F5** **Batch** Print, transmit or archive by batches; see Batch Processing.

**F6** **Sort** Sort samples by various criteria; see Data Base Sorting.

**F7** **Tag** Tag or untag a sample for batch processing.

**Alt** **F7** **Tag All**
Tag or untag all samples for batch processing. Key strokes active, but not seen on screen.

**F8** **Transmit**
Transmit highlighted sample to a host computer. To transmit more than one sample, use Batch mode.

**F11** **WL** Go to the Worklist.

**F12** **DB** When an entry on this screen is highlighted and you press **F12**, the display automatically changes to the Run Samples/Data Base option and shows the results of the highlighted entry. You can look at other sorted sample results while you are there by using the keys indicated on the status line, then press **F12** to return to the Data Base Query screen. When you return to the Data Base Query screen, the sample that was on display in Run Samples/Data Base when you pressed **F12** is highlighted on this list.

(←)(→) **Next** Toggle display between groups of parameter results.

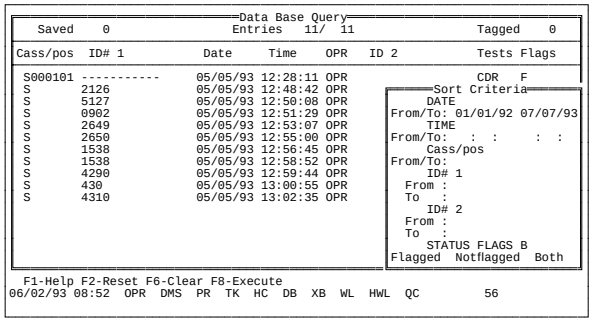
These messages might appear at the bottom of the screen.

*RESULTS NOT AVAILABLE* - It means results are not stored in the data base. They may have been overwritten when wraparound occurred, or they were never received in the data base.

*MAXIMUM NUMBER OF SAMPLES ALREADY SAVED* - It means that 150 samples are already saved. To save additional samples, you must unsave some of the already saved samples; place the cursor on the saved sample and press F2.

## DATA BASE SORTING

**Sample Analysis**
**Data Base Query**
**F6 Sort**




Use this option to select a subset of the samples stored in the data base. You can select samples by date and time, Cass/Pos, ID#1, ID#2, and flag status. The maximum number of samples that can be sorted at one time is 1000. These rules apply to sorting:

1. You can sort by ID#1 or ID#2, but not both in a single sort.

2. Any sort can include date or flag limitation.

3. Time selection requires date selection also.

4. The Sort Criteria are separate. If you select a time period, it will be the same time period on each day selected. You cannot sort from a start time on one day to an end time on another day, inclusive.

5. When sorting ID#1 or ID#2, enter the full name or identifier to start from and go to. To sort the full alphabet, enter from A to ZZ. Make all numeric identifications the same length; if a numeric ID is shorter than other IDs in the data base, enter leading zeros to make it the same length.

6. When entering ID#1 or ID#2 data for sorting, you can use uppercase or lowercase letters or both, but you must be consistent with what has been entered on the Worklist.

7. If you do not choose any sort criteria, the samples in the Data Base are sorted chronologically by date and time.

8. Blank sort criteria fields for DATE, TIME, Cass/pos, ID#1, ID#2 and STATUS FLAGS mean that **all** data for that criterion is selected.

9. When B (Both) is selected for the STATUS FLAGS, the non-flagged samples are sorted first, then the flagged samples (those with F or PA in the Flags field). Edited data is posted as flagged. Each group is sorted chronologically.

When you select this option:

- The "from" date displays today's date; the "to" date is blank.
- You can use F2 to change the dates to the dates used for the previous sort.
- The other criteria that were selected the last time the Sort option was used appear on the screen.

Set the criteria as you want them now. These settings remain until you change them.

Function keys available:

**F1 Help**

**F2 Reset** Reset a field to its previous setting. Use before executing the sort, or after clearing a field to blank by pressing F6.

**F6 Clear** Clear a field to blank. A blank field indicates no limits; that is, that all entries for that criterion will be included.

**F8 Execute** Execute the sorting process after all criteria have been set. The samples you selected to be sorted are listed on the screen. To view the graphic results of a sorted sample, place the cursor on that line and press F12. To view tabular results, press F3.

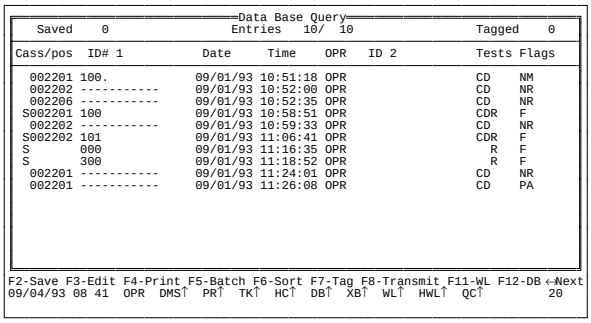
**F9 Main** Return to Main Menu.

**F10 Save/Esc**
Save all the sort criteria except date for further use, but do not sort by them now. The FROM date always defaults to today's date.

If you press Esc before you execute the sorting process, all criteria except date revert to their previous settings. The FROM date always defaults to today's date.

# DATA BASE QUERY, RESULTS

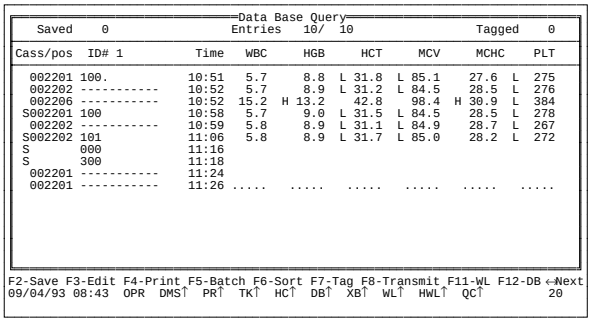
### Sample Analysis
### Data Base Query



```
                              Data Base Query
   Saved    0                 Entries   10/  10                 Tagged    0

Cass/pos  ID# 1          Date     Time    OPR   ID 2           Tests Flags

  002201 100.          09/01/93 10:51:18 OPR                  CD    NM
  002202 -----------   09/01/93 10:52:00 OPR                  CD    NR
  002206 -----------   09/01/93 10:52:35 OPR                  CD    NR
 S002201 100           09/01/93 10:58:51 OPR                  CDR   F
  002202 -----------   09/01/93 10:59:33 OPR                  CD    NR
 S002202 101           09/01/93 11:06:41 OPR                  CDR   F
 S       000           09/01/93 11:16:35 OPR                    R   F
 S       300           09/01/93 11:18:52 OPR                    R   F
  002201 -----------   09/01/93 11:24:01 OPR                  CD    NR
  002201 -----------   09/01/93 11:26:08 OPR                  CD    PA

F2-Save F3-Edit F4-Print F5-Batch F6-Sort F7-Tag F8-Transmit F11-WL F12-DB ←Next
09/04/93 08 41  OPR  DMS↑  PR↑  TK↑  HC↑  DB↑  XB↑  WL↑  HWL↑  QC↑          20
```

To view parameter results from the Data Base Query screen, press → or ←. The list in this example shows these profiles:

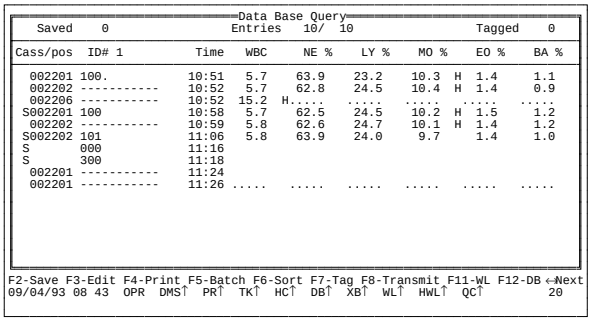
R = Retic only
CD = CBC/Diff
CDR = CBC/Diff + Retic



```
                              Data Base Query
   Saved    0                 Entries   10/  10                 Tagged    0

Cass/pos  ID# 1          Time   WBC     HGB      HCT      MCV      MCHC     PLT

  002201 100.          10:51   5.7     8.8  L 31.8  L 85.1    27.6  L  275
  002202 -----------   10:52   5.7     8.9  L 31.2  L 84.5    28.5  L  276
  002206 -----------   10:52  15.2  H 13.2    42.8     98.4  H 30.9  L  384
 S002201 100           10:58   5.7     9.0  L 31.5  L 84.5    28.5  L  278
  002202 -----------   10:59   5.8     8.9  L 31.1  L 84.9    28.7  L  267
 S002202 101           11:06   5.8     8.9  L 31.7  L 85.0    28.2  L  272
 S       000           11:16
 S       300           11:18
  002201 -----------   11:24
  002201 -----------   11:26 .....   .....   .....   .....   .....   .....

F2-Save F3-Edit F4-Print F5-Batch F6-Sort F7-Tag F8-Transmit F11-WL F12-DB ←Next
09/04/93 08:43  OPR  DMS↑  PR↑  TK↑  HC↑  DB↑  XB↑  WL↑  HWL↑  QC↑          20
```

Press → once to view:

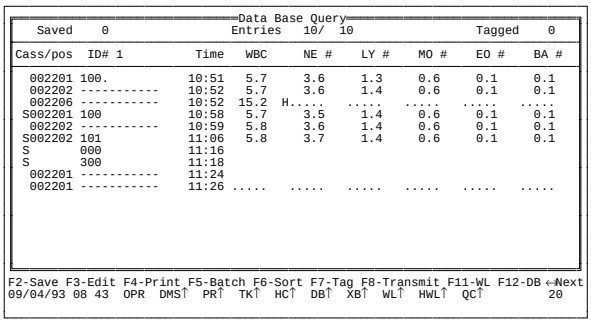
WBC, HGB, HCT, MCV, MCHC, PLT



```
                              Data Base Query
   Saved    0                 Entries   10/  10                 Tagged    0

Cass/pos  ID# 1          Time   WBC     NE %     LY %     MO %     EO %    BA %

  002201 100.          10:51   5.7    63.9     23.2     10.3  H  1.4     1.1
  002202 -----------   10:52   5.7    62.8     24.5     10.4  H  1.4     0.9
  002206 -----------   10:52  15.2  H.....   .....    .....    .....   .....
 S002201 100           10:58   5.7    62.5     24.5     10.2  H  1.5     1.2
  002202 -----------   10:59   5.8    62.6     24.7     10.1  H  1.4     1.2
 S002202 101           11:06   5.8    63.9     24.0      9.7     1.4     1.0
 S       000           11:16
 S       300           11:18
  002201 -----------   11:24
  002201 -----------   11:26 .....   .....   .....   .....   .....   .....

F2-Save F3-Edit F4-Print F5-Batch F6-Sort F7-Tag F8-Transmit F11-WL F12-DB ←Next
09/04/93 08 43  OPR  DMS↑  PR↑  TK↑  HC↑  DB↑  XB↑  WL↑  HWL↑  QC↑          20
```

Press → again to view:

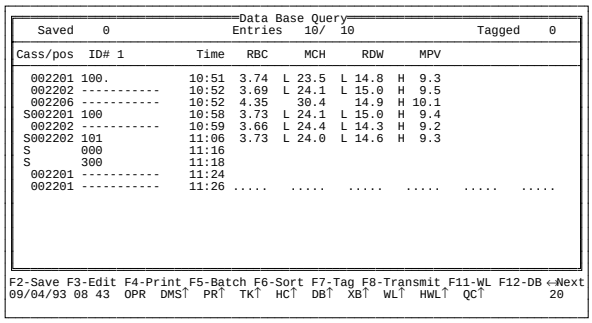
WBC, NE%, LY%, MO%, EO%, BA%



```
                              Data Base Query
   Saved    0                 Entries   10/  10                 Tagged    0

Cass/pos  ID# 1          Time   WBC     NE #     LY #     MO #     EO #    BA #

  002201 100.          10:51   5.7     3.6      1.3      0.6      0.1     0.1
  002202 -----------   10:52   5.7     3.6      1.4      0.6      0.1     0.1
  002206 -----------   10:52  15.2  H.....   .....    .....    .....   .....
 S002201 100           10:58   5.7     3.5      1.4      0.6      0.1     0.1
  002202 -----------   10:59   5.8     3.6      1.4      0.6      0.1     0.1
 S002202 101           11:06   5.8     3.7      1.4      0.6      0.1     0.1
 S       000           11:16
 S       300           11:18
  002201 -----------   11:24
  002201 -----------   11:26 .....   .....   .....   .....   .....   .....

F2-Save F3-Edit F4-Print F5-Batch F6-Sort F7-Tag F8-Transmit F11-WL F12-DB ←Next
09/04/93 08 43  OPR  DMS↑  PR↑  TK↑  HC↑  DB↑  XB↑  WL↑  HWL↑  QC↑          20
```

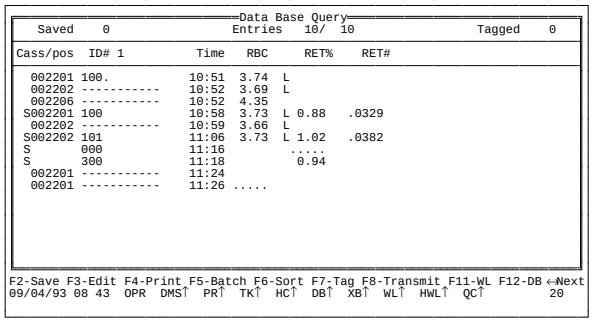
Press → again to view:

WBC, NE#, LY#, MO#, EO#, BA#




Press → again to view:

RBC, MCH, RDW, MPV

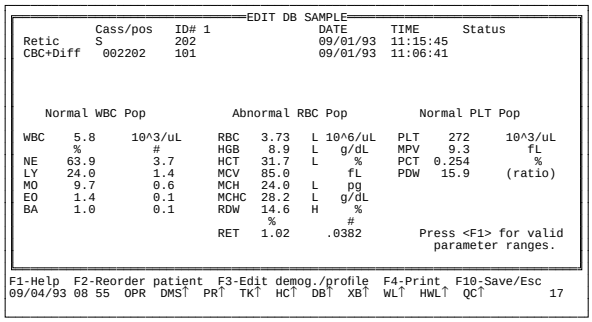



Press → again to view:

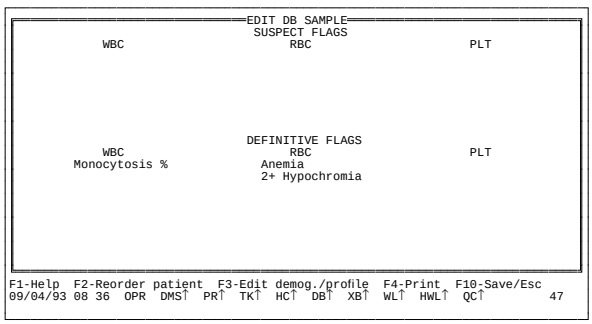
RBC, RET%, RET#

# EDIT DB SAMPLE

**Sample Analysis**
**Data Base Query**
**F3 Edit**


EDIT DB SAMPLE
Cass/pos ID# 1 DATE TIME Status
Retic S 202 09/01/93 11:15:45
CBC+Diff 002202 101 09/01/93 11:06:41
Normal WBC Pop Abnormal RBC Pop Normal PLT Pop
WBC 5.8 10^3/uL RBC 3.73 L 10^6/uL PLT 272 10^3/uL
% # HGB 8.9 L g/dL MPV 9.3 fL
NE 63.9 3.7 HCT 31.7 L % PCT 0.254 %
LY 24.0 1.4 MCV 85.0 fL PDW 15.9 (ratio)
MO 9.7 0.6 MCH 24.0 L pg
EO 1.4 0.1 MCHC 28.2 L g/dL
BA 1.0 0.1 RDW 14.6 H %
% #
RET 1.02 .0382 Press <F1> for valid parameter ranges.
F1-Help F2-Reorder patient F3-Edit demog./profile F4-Print F10-Save/Esc
09/04/93 08 55 OPR DMS↑ PR↑ TK↑ HC↑ DB↑ XB↑ WL↑ HWL↑ QC↑ 17

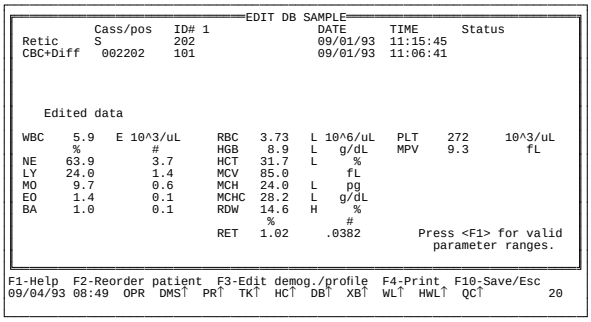
This screen shows the tabular results for the entry that was highlighted on the Data Base Query list. This display includes all data, except graphics, from the Run Samples screen. This example is a collated CBC/Diff and Retic sample.


EDIT DB SAMPLE
SUSPECT FLAGS
WBC RBC PLT
DEFINITIVE FLAGS
WBC RBC PLT
Monocytosis % Anemia
2+ Hypochromia
F1-Help F2-Reorder patient F3-Edit demog./profile F4-Print F10-Save/Esc
09/04/93 08 36 OPR DMS↑ PR↑ TK↑ HC↑ DB↑ XB↑ WL↑ HWL↑ QC↑ 47

Press End or PgDn to see any Suspect or Definitive messages. If WBC, RBC or PLT is overrange, its average numeric value appears at the bottom of this screen. You can look at the overrange value, but you cannot edit it, print it, or transmit it to a host computer. This value is for review only; do not report it.

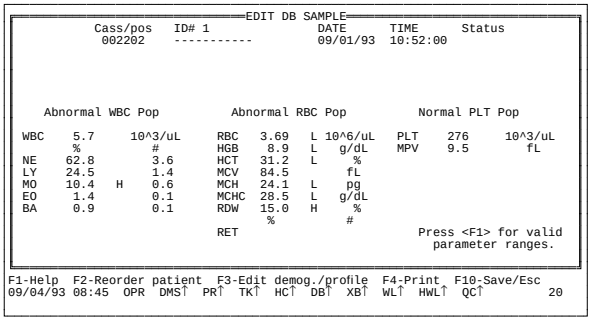
Press Home or PgUp to go back to EDIT DB SAMPLE screen.

You can edit all fields except the selected Positive Identifier, the date and time the sample was processed, and any messages in the status field.


EDIT DB SAMPLE
Cass/pos ID# 1 DATE TIME Status
Retic S 202 09/01/93 11:15:45
CBC+Diff 002202 101 09/01/93 11:06:41
Edited data
WBC 5.9 E 10^3/uL RBC 3.73 L 10^6/uL PLT 272 10^3/uL
% # HGB 8.9 L g/dL MPV 9.3 fL
NE 63.9 3.7 HCT 31.7 L %
LY 24.0 1.4 MCV 85.0 fL
MO 9.7 0.6 MCH 24.0 L pg
EO 1.4 0.1 MCHC 28.2 L g/dL
BA 1.0 0.1 RDW 14.6 H %
% #
RET 1.02 .0382 Press <F1> for valid parameter ranges.
F1-Help F2-Reorder patient F3-Edit demog./profile F4-Print F10-Save/Esc
09/04/93 08:49 OPR DMS↑ PR↑ TK↑ HC↑ DB↑ XB↑ WL↑ HWL↑ QC↑ 20

If a field is edited, E appears in the field in all sample analysis and data base displays, transmission to host, and printouts. E overrides an H/L flag and appears in the same position.

If a sample has been cycled in the CBC mode, do not edit the differential parameters. They will not be printed on a ticket.


EDIT DB SAMPLE
Cass/pos ID# 1 DATE TIME Status
002202 ---------- 09/01/93 10:52:00
Abnormal WBC Pop Abnormal RBC Pop Normal PLT Pop
WBC 5.7 10^3/uL RBC 3.69 L 10^6/uL PLT 276 10^3/uL
% # HGB 8.9 L g/dL MPV 9.5 fL
NE 62.8 3.6 HCT 31.2 L %
LY 24.5 1.4 MCV 84.5 fL
MO 10.4 H 0.6 MCH 24.1 L pg
EO 1.4 0.1 MCHC 28.5 L g/dL
BA 0.9 0.1 RDW 15.0 H %
% #
RET Press <F1> for valid parameter ranges.
F1-Help F2-Reorder patient F3-Edit demog./profile F4-Print F10-Save/Esc
09/04/93 08:45 OPR DMS↑ PR↑ TK↑ HC↑ DB↑ XB↑ WL↑ HWL↑ QC↑ 20

You cannot edit the Positive identifier(s), sample date or time, or numeric results for samples that have a *NO READ* or *PART.ASP* message in the Status field. You can edit a sample with *ID MISMATCH, NO MATCH* and *COLLATE FAILED* messages in the Status field.

You can edit parameter results of ++++, ----, ...., or : : : :. If you edit a result, an E appears next to it.

If you edit an existing RBC count or RET%, the RET# is recalculated and stored in the data base when you press F10 or F4.

If you edit any parameter result:

- The population messages disappear.
- The message *EDITED DATA* appears in the Population message field.
- No population Suspect or Definitive messages are printed or transmitted to a host computer. **Exception**: When RET% is edited for a collated CBC/Diff/Retic sample with Suspect or Definitive messages, the messages are not removed.

- The *EDITED DATA* message appears on the Graphic printout.
- E is printed on the Graphic printout and on the ticket next to edited result.
- Data transmitted to a host computer includes the *EDITED DATA* message and the E flag(s).

## Editing RBC for a Retic Sample

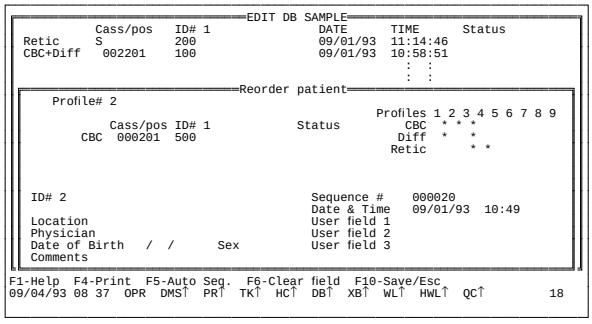
For a sample analyzed as Retic only, you can enter the RBC to get the Retic absolute number value. When you press **Enter**, an "E" appears next to the edited parameter. To save the edit and calculate an absolute number, press **F10** **Save/Esc**. An "e" appears to the right of the result.

To view the calculated result, press **F3**.

If you edit the RET% value or the RBC value again, the absolute value is recalculated.

# REORDER PATIENT

**Sample Analysis**
**Data Base Query**
**Alt** **F2** or **F3** **Edit**
**F2** **Reorder patient**


EDIT DB SAMPLE
Cass/pos ID# 1 DATE TIME Status
Retic S 200 09/01/93 11:14:46
CBC+Diff 002201 100 09/01/93 10:58:51
Reorder patient
Profile# 2
Profiles 1 2 3 4 5 6 7 8 9
Cass/pos ID# 1 Status CBC * * *
CBC 000201 500 Diff * *
Retic * *
ID# 2
Sequence # 000020
Date & Time 09/01/93 10:49
Location
User field 1
Physician
User field 2
Date of Birth / / Sex
User field 3
Comments
F1-Help F4-Print F5-Auto Seq. F6-Clear field F10-Save/Esc
09/04/93 08 37 OPR DMS↑ PR↑ TK↑ HC↑ DB↑ XB↑ WL↑ HWL↑ QC↑ 18

If you decide to repeat a test on a sample, or run a different test on the sample independently, you can use this feature to preassign it to the Worklist.

When you open this window, the existing demographic data for this sample is copied to it.

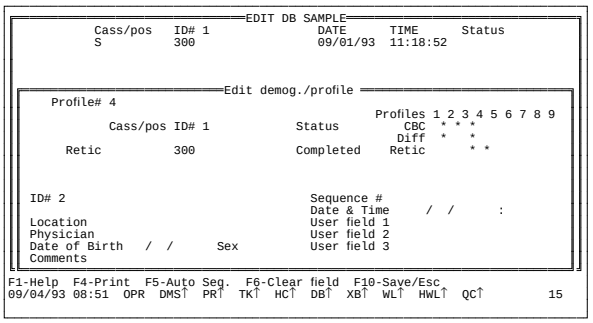
Select a Profile and enter the required identifiers. You can enter or change any other information.

You can use F5 to check the Auto-sequence settings. If Auto-sequencing is ON for the indicated test, you can assign a sequence number by pressing Enter.

This sample is posted to the Worklist and is treated like a separate entry.

## EDIT PROFILE/DEMOGRAPHICS

**Sample Analysis**
**Data Base Query**
Alt F3 or F3 **Edit**
F3 **Edit demog./profile**

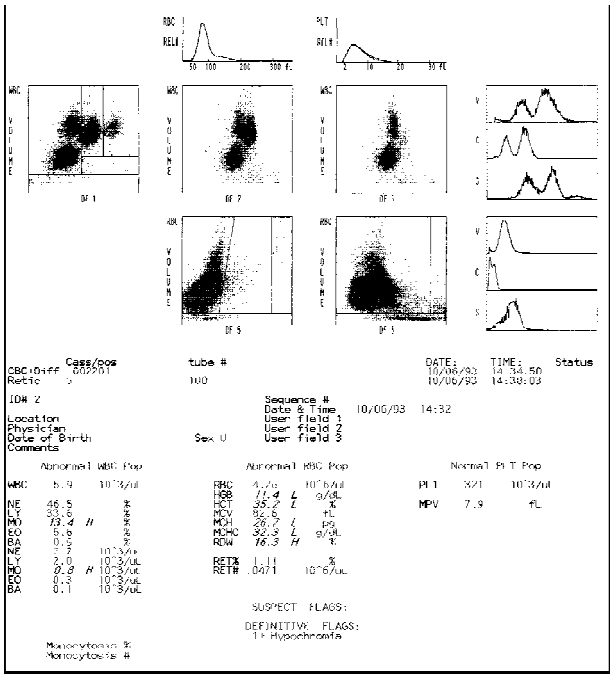

EDIT DB SAMPLE
Cass/pos ID# 1 DATE TIME Status
S 300 09/01/93 11:18:52
Edit demog./profile
Profile# 4
Profiles 1 2 3 4 5 6 7 8 9
Cass/pos ID# 1 Status CBC * * *
Diff * *
Retic 300 Completed Retic * *
ID# 2
Sequence #
Date & Time / / :
Location
User field 1
Physician
User field 2
Date of Birth / / Sex
User field 3
Comments
F1-Help F4-Print F5-Auto Seq. F6-Clear field F10-Save/Esc
09/04/93 08:51 OPR DMS↑ PR↑ TK↑ HC↑ DB↑ XB↑ WL↑ HWL↑ QC↑ 15

You can modify the patient demographic data or add a test to an existing sample.

To add a test, select a new profile. The profile must be one that includes the tests that are already complete. You can add a test but you cannot delete a completed one. For example, if you have already run a Retic sample and want to add a CBC/Diff, select profile 3. The status field for the Retic sample shows Completed. Enter the Positive Identifier for the new test, which is the CBC/Diff. You can modify any demographic data you want. This new assignment is posted to the Worklist, and when the new test is complete, results will be collated.

You can use PgUp and PgDn to scroll through the sorted entries. If an entry is modified, PgDn saves the changes; PgUp discards them.

# COLLATING

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Collating is the process of combining the results of two or more runs of the same sample in different modes. You can view, print and transmit collated reports. This is an example of a collated printout that includes graphics.

**Requirements for Collation**

For collating to occur, these requirements must be met.

- Only CBC/Diff and Retic samples can be collated.
- You must preassign the sample for multiple tests. You can either
    1. Preassign both tests on the Worklist, or
    2. Assign another test to an existing sample result in Data base, by editing the profile.
- There cannot be duplicate tests in a single collated report.
- Each test run on the sample can be part of only one collated report.

**Collating Rules**

Collation of test results does <u>not</u> occur if any of these conditions exist

1. There is a partial aspiration (.....).
2. There is a *NO READ* message.
3. There is a *NO MATCH* message.

The following conditions cause a *COLLATE FAILED* message to appear on the Worklist, a CF message to appear in the Data Base Query Flags field, and a *Collate failed because....* message to be posted to the Error Log. These messages are described in the Special Procedures and Troubleshooting manual, PN 4237187.

1. The second test is not run within 24 hrs of the first test.

2. RBC votes out (-----).

3. RBC is incomplete (.....).

4. RBC is overrange (+++++).

5. RBC has been edited (E).

6. Flow cell is clogged (:::::); affects Diff and Retic results.

7. Insufficient data for Retic results (.....).

8. Diff percent or Retic is incomplete (.....).

9. Invalid Diff or Retic percent (negative percent or greater than 100 percent) detected (?????).

10. Internal criteria for collating failed.

**Summary of Collate Fail Causes**

- Second test not run within 24 hrs of first test
- Partial aspiration
- *NO READ*
- *NO MATCH*
- RBC is -----, ....., +++++, E
- Diff or Retic % is ....., ?????
- Flow cell clogged, :::::

## Automatic Collation

- Preassign CBC/Diff/Retic profile on the Worklist before either test performed.
- Preassign Retic after doing CBC/Diff or vice versa
  - Sort CBC/Diff or Retic from Data Base Query.
  - Select sample on Data Base Query list.
  - Press Alt F3 **Edit demog./profile.**
  - Change profile to include test to be collated.
  - Run pending test.

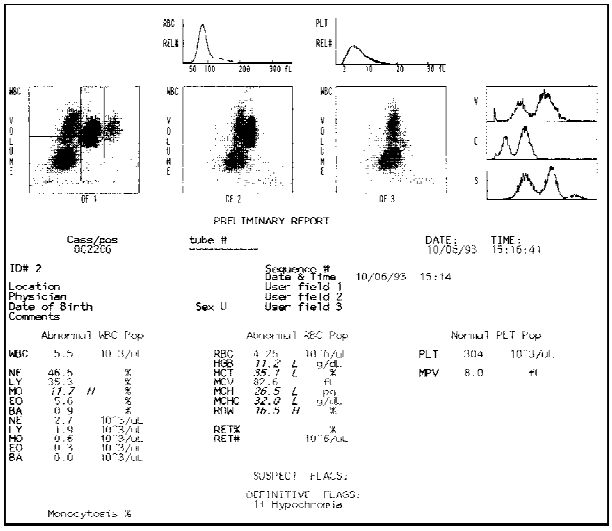
## Manual Collation

- Sort CBC or CBC/Diff sample from Data Base Query.
- Press F3 **Edit**.
- Edit RET%. DMS calculates RET#.

**OR**

- Sort Retic sample from Data Base Query.
- Press F3 **Edit.**
- Edit RBC from previously run CBC/Diff. DMS calculates RET#.

## Preliminary Report

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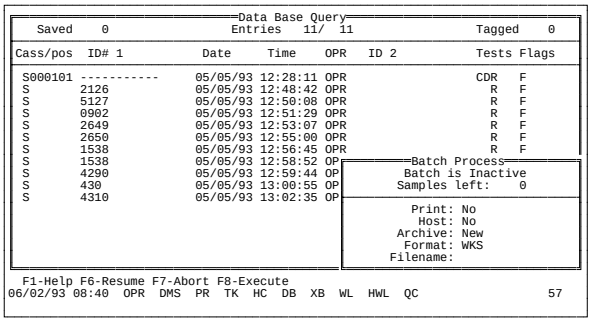
If you print a report before both preassigned tests have been run, the report gives the results for the completed test and a PRELIMINARY REPORT message.

# DATA BASE BATCH PROCESSING

**IMPORTANT**

**Do not cycle the instrument while batch processing. If you do, the instrument stops.**

### Sample Analysis
### Data Base Query
### F5 Batch




Use this option to print, transmit, or archive a group of samples stored in the data base. Tag the samples you want to process before you select the Batch option; use **F7 Tag** or **Alt F7 Tag All**. If you select both the printing and transmitting processes, each tagged sample is printed on the Graphic Printer then transmitted to the host before processing of the next tagged sample begins. You can also archive samples to a diskette.

Data that is transmitted to a host computer goes through a buffer called a spooler. If the spooler is enabled, and the host computer is not ready to receive, the spooler holds up to 1000 samples until the host computer is ready. To clear the host computer's spooler, use the Reset Communications Board option in Special Functions.

When the Batch Processing window is open, you have these function-key options:

**F1 Help**

**F2 Choice list**
Appears only when cursor is in Archive field. Presents a choice list for the Archive field: No New, All.

**F6 Resume** Resume batch processing after you have used **F7 Abort** to stop the process. This function resumes batch processing where it left off when stopped.

**F7 Abort** Abort the batch process.

**F8 Execute** Execute the batch process. If you have aborted the batch process, this function starts the process from the beginning according to the criteria set.

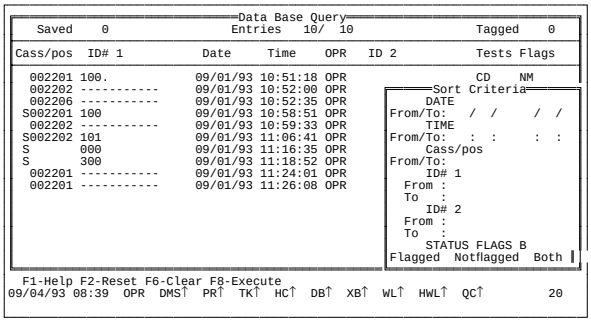
**F10 Save** Save Batch window choices and file name.

**Esc** Discard changes and exit to previous screen.

The Batch Process window includes a message that tells you whether batch processing is active or inactive. If processing is active, the window displays how many samples are left to be processed.

# ARCHIVING FROM DATA BASE

### Sample Analysis
### Data Base Query
### F6 Sort


Data Base Query
Saved 0
Entries 10/ 10
Tagged 0
Cass/pos ID# 1 Date Time OPR ID 2 Tests Flags
002201 100. 09/01/93 10:51:18 OPR CD NM
002202 ---------- 09/01/93 10:52:00 OPR CD NM
002206 ---------- 09/01/93 10:52:35 OPR CD NR
S002201 100 09/01/93 10:58:51 OPR CDR F
002202 ---------- 09/01/93 10:59:33 OPR CD NR
S002202 101 09/01/93 11:06:41 OPR CDR F
S 000 09/01/93 11:16:35 OPR R F
S 300 09/01/93 11:18:52 OPR
002201 ---------- 09/01/93 11:24:01 OPR
002201 ---------- 09/01/93 11:26:08 OPR
Sort Criteria
DATE
From/To: / / / /
TIME
From/To: : : : :
Cass/pos
From/To:
ID# 1
From :
To :
ID# 2
From :
To :
STATUS FLAGS B
Flagged Notflagged Both
F1-Help F2-Reset F6-Clear F8-Execute
09/04/93 08:39 OPR DMS↑ PR↑ TK↑ HC↑ DB↑ XB↑ WL↑ HWL↑ QC↑ 20

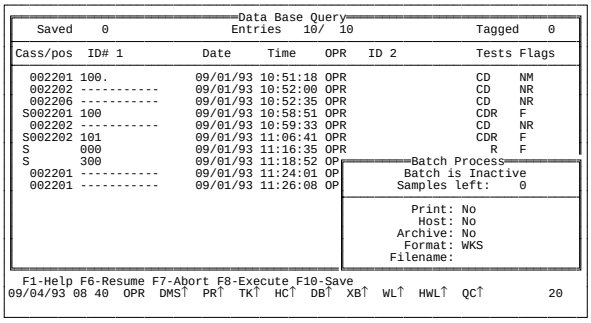
The DMS Archive feature lets you copy data from the DMS and retrieve it on another computer in a spreadsheet format. The spreadsheet program must be one that is compatible with the .WKS extension of the file name.

1. Sort Data Base samples as desired. You can sort up to 1000 at a time.

2. On the sorted list, tag samples you want to archive.

   - **F7 Tag** to tag individual samples highlighted by cursor

   - **Alt F7** to tag all samples on sorted list.


Data Base Query
Saved 0
Entries 10/ 10
Tagged 0
Cass/pos ID# 1 Date Time OPR ID 2 Tests Flags
002201 100. 09/01/93 10:51:18 OPR CD NM
002202 ---------- 09/01/93 10:52:00 OPR CD NR
002206 ---------- 09/01/93 10:52:35 OPR CD NR
S002201 100 09/01/93 10:58:51 OPR CDR F
002202 ---------- 09/01/93 10:59:33 OPR CD NR
S002202 101 09/01/93 11:06:41 OPR CDR F
S 000 09/01/93 11:16:35 OPR R F
S 300 09/01/93 11:18:52 OP
002201 ---------- 09/01/93 11:24:01 OP
002201 ---------- 09/01/93 11:26:08 OP
Batch Process
Batch is Inactive
Samples left: 0
Print: No
Host: No
Archive: No
Format: WKS
Filename:
F1-Help F6-Resume F7-Abort F8-Execute F10-Save
09/04/93 08 40 OPR DMS↑ PR↑ TK↑ HC↑ DB↑ XB↑ WL↑ HWL↑ QC↑ 20

3. Press **F5 Batch** to go to Batch Process window.

4. Move cursor to the Archive field.

   a. Press **F2** to see the Archive choice list.

      - Use ↑ and ↓ press **Enter** to make selection.

      - If you select New, all tagged samples that have not yet been archived will be processed.

      - If you select All, all tagged samples will be processed, even if they have already been archived.

      - If you select None, Archive is inactive.

b. Move cursor to Filename field and enter the file name. Use up to eight characters plus a .XXX extension. If you do not enter an extension, the system automatically adds a .WKS extension.

   Example: 23June93.WKS

5. Insert a formatted disk in the DMS disk drive.

6. Press F8 **Execute**. A *Batch is Active* message appears in the Batch Process window while the process takes place.

---

**IMPORTANT**

**Do not remove the disk from the drive until the *Batch is Inactive* message appears in the Batch Process window. Removing the disk sooner can cause disk corruption.**

---

7. Wait until the *Batch is Inactive* message appears, then remove the disk from the drive.

## To Review Archived Files

1. Insert disk in a computer with a spreadsheet program that is compatible with the .WKS extension of the file name.

2. Retrieve the file you want.

This file contains all the information that was in the Data Base.

Each column is labeled, but some of the labels are condensed. To view the complete column label, either

- widen the column, or
- move the active cell cursor to the label.

The key to these codes is:

- In the C/P Edit and ID1 Edit fields:

  0 = not edited
  1 = edited

- In the Status field:

  0 = Blank/Not used/Matched
  1 = Partial aspiration
  2 = No Match
  3 = No Read
  4 = Mismatch
  5 = Collate failure

- WBC Population
  RBC Population
  Plt Population

  0 = Normal
  1 = Abnormal
  2 = Edited

- All Suspect and Definitive flags except Imm Grans/Bands

  blank = no flag
  1 = flag

- Imm Grans/Bands Suspect flag

  blank = no flag
  1 = IMM GRANS/BANDS 1
  2 = IMM GRANS/BANDS 2

- In the Mode of Aspiration field:

  1 = Primary mode
  2 = Secondary mode

Some of the columns use one-character codes to represent what is in them.

Example:

```
Cass/Pos  C/P Edit   ID#1  ID1 Edit
 002201      0      063037    1
 002202      1      102036    0
 002203      0      110362    1
```

Example:

```
Status
  0
  1
  5
  0
  3
```

Example:

```
WBC Pop
     0
     0
     1
     2
```

Example:

```
Neutrophilia #

              1
```

Example:

```
Imm Grans/Bands
             1

             2
```

Example:

```
Aspiration Mode
              2
              1
              1
```

# DELETE DATA BASE

**Special Functions**
**Set Up**
**Sample Analysis**

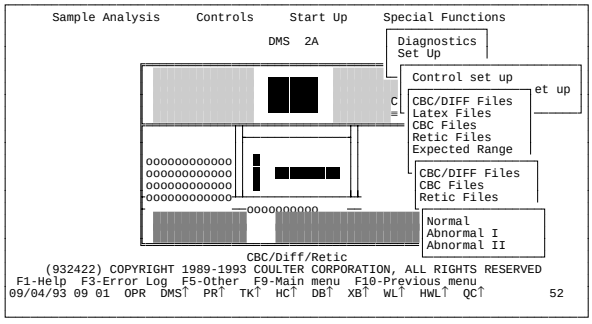
When you delete the data base, the last sample run remains in the buffer, and is displayed when you go to the Run Sample screen. The buffer sample disappears after the next cycle occurs. When you delete the data base, samples that are pending in the host spooler are not deleted.

This section includes:

Expected Ranges
Auto-Stop Option
IQAP ID Setup
Control Management by Shift
Control File Setup
CBC/Diff File Setup
Latex File Setup
CBC File Setup
Retic File Setup
How Controls are Processed
QC Status
Control Error Conditions
CBC/Diff Control File Review
CBC/Diff Control Graphics Display
Latex Control File Review
CBC Control File Review
Retic Control File Review
Batch Processing Controls
XB Analysis

## EXPECTED RANGES

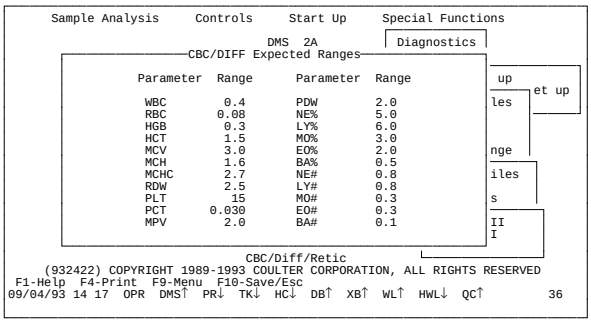
**Special Functions**
**Set Up**
**Control set up**
**Expected Range**
**CBC/Diff Files**
**CBC Files**
**Retic Files**




When you select **Expected Range**, another menu gives you the choice of CBC/Diff, CBC or Retic files.

When you select one of these options, another menu gives you the available levels for that option. Enter the Expected Range for each level for each type of file.

To save, press F10.


Sample Analysis Controls Start Up Special Functions
DMS 2A
Diagnostics
CBC/DIFF Expected Ranges
Parameter Range Parameter Range
WBC 0.4 PDW 2.0
RBC 0.08 NE% 5.0
HGB 0.3 LY% 6.0
HCT 1.5 MO% 3.0
MCV 3.0 EO% 2.0
MCH 1.6 BA% 0.5
MCHC 2.7 NE# 0.8
RDW 2.5 LY# 0.8
PLT 15 MO# 0.3
PCT 0.030 EO# 0.3
MPV 2.0 BA# 0.1
CBC/Diff/Retic
(932422) COPYRIGHT 1989-1993 COULTER CORPORATION, ALL RIGHTS RESERVED
F1-Help F4-Print F9-Menu F10-Save/Esc
09/04/93 14 17 OPR DMS↑ PR↓ TK↓ HC↓ DB↑ XB↑ WL↑ HWL↓ QC↑ 36

If the expected ranges on the control's assay sheet are different from the DMS default values, or if your laboratory has established its own Expected Ranges, enter them before you set up your control file. Then when you set up the control file, these ranges are automatically posted to the file according to the coded lot numbers.

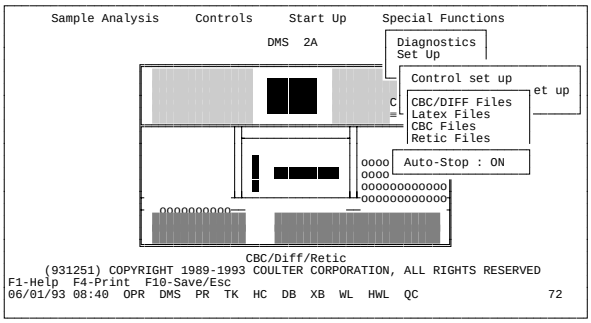
## SET AUTO-STOP OPTION

**Special Functions**
**Set Up**
**Control Set Up**
**Auto-Stop**

The Auto-Stop option applies to the CBC, CBC/DIFF and Retic controls; it does not apply to latex controls. When the Auto-Stop option is ON, the Analyzer stops if:

- The control file is not found. (CBC/DIFF and Retic controls only)
- The control file is full.
- The control is not within the expected value range.
- The control is expired.
- The Disk drive is full.

When the option is OFF, the Analyzer continues analyzing samples when a control error occurs.




To change the Auto-Stop option, press the spacebar to toggle the setting between OFF and ON. When you change the setting, press

F10 to save the entry.

The default setting for the Auto-Stop option is ON.

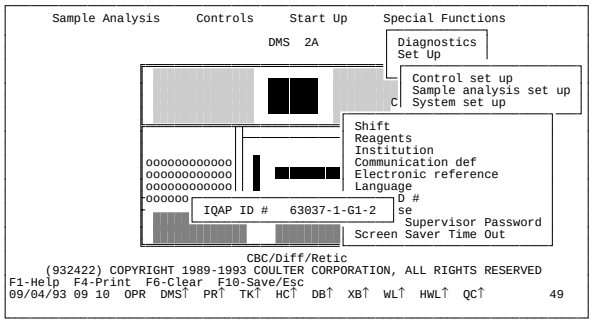
The arrow next to QC on the status line indicates whether the Auto-Stop option is ON or OFF. When the arrow points up, Auto-Stop is on; when it points down, Auto-Stop is off.

If an Auto-Stop condition occurs, to clear the error line and resume operation, press

The message *Operator acknowledged Control System Stop errors* appears on the error line. Press again to clear the error line

## IQAP ID SET UP

**Special Functions**
**Set Up**
**System Set Up**
**IQAP ID #**




The Interlaboratory Quality Assurance Program (IQAP) identification number is assigned to your system when you enroll in the IQAP program. Use this option to enter your IQAP ID number. It then appears on all Control Set Up and Review screens.

If the last digit in the IQAP number is blank, zero or one, the IQAP program combines all data into one shift. One IQAP report is generated for that level of control.

To receive a separate report for each shift, the IQAP number for shifts two and three would look like this;

XXXXX-1-G1-2 and
XXXXX-1-G1-3

When you set up the IQAP number, leave the shift designator blank.

When you set up a control file, after you enter the control Lot #, press **Enter** to go to the IQAP # field. Move the cursor to the end of the IQAP number and designate a shift number unique to this control file. Be careful not to change anything else in the IQAP number. The Shift field beneath this also says Shift, but the IQAP program does not read this. Be sure to make these numbers agree.

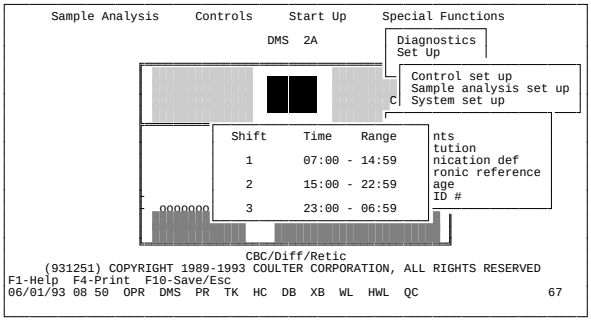
Enter your IQAP ID number, then press

**F10 Save/Esc**

to save the entry.

## CONTROL MANAGEMENT BY SHIFT

**Special Functions**
**Set Up**
**System Set Up**
**Shift**

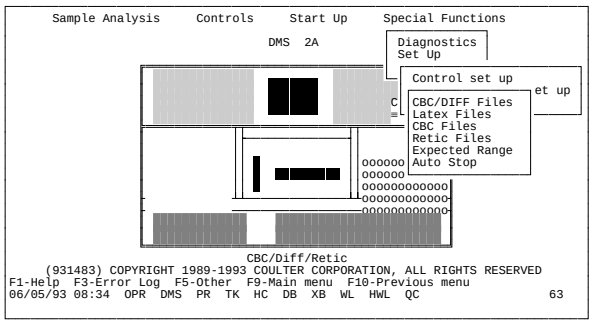


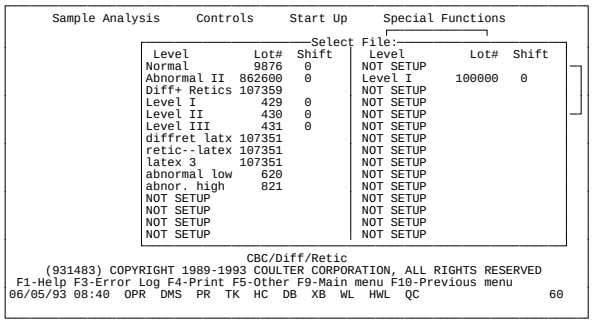

You can use the same lots of 5C cell control, 4C PLUS cell control and Retic-C cell control on different shifts (time frames) and store them in separate files. This option lets you generate separate control statistics for each shift.

The Shift Set Up screen is displayed with default time frames. If you want to set up only two shifts, set the third shift to 1 minute long; the time periods add up to 24 hours automatically.

# CONTROL FILE SET UP

**Special Functions**
**Set Up**
**Control Set up**




Select the type of control file you want and press **Enter**. The Select file window appears.

There are 30 control files. Each file holds 100 control cycles.

The cursor is on the first file that is not set up.

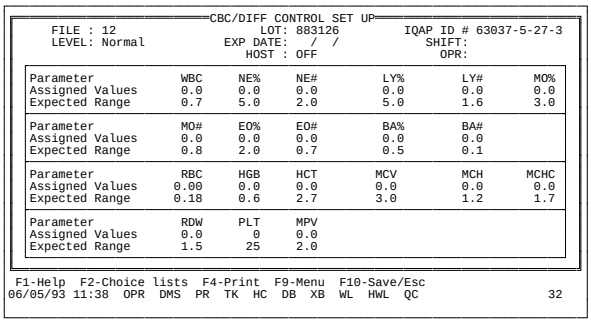
Press **Enter**. A setup screen appears for the control type you selected.

The IQAP number that was entered in IQAP setup is automatically entered on each setup screen. You can modify it if you wish.

# CBC/DIFF FILE SETUP

**Special Functions**
**Set Up**
**Control set up**
**CBC/DIFF Files**
**Select File**

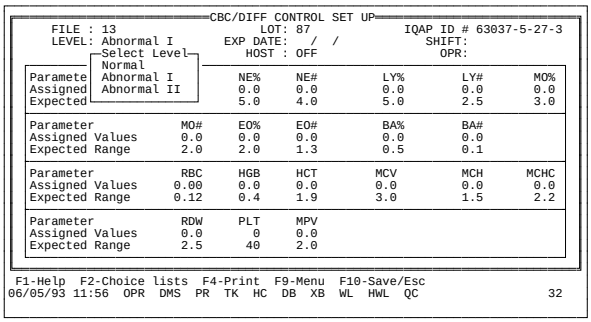
In the Select File window, the cursor is on the first file that is not set up. Press **Enter** to open the file.


CBC/DIFF CONTROL SET UP
FILE : 12
LOT: 883126
IQAP ID # 63037-5-27-3
LEVEL: Normal
EXP DATE: / /
SHIFT:
HOST : OFF
OPR:
Parameter WBC NE% NE# LY% LY# MO%
Assigned Values 0.0 0.0 0.0 0.0 0.0 0.0
Expected Range 0.7 5.0 2.0 5.0 1.6 3.0
Parameter MO# EO% EO# BA% BA#
Assigned Values 0.0 0.0 0.0 0.0 0.0
Expected Range 0.8 2.0 0.7 0.5 0.1
Parameter RBC HGB HCT MCV MCH MCHC
Assigned Values 0.00 0.0 0.0 0.0 0.0 0.0
Expected Range 0.18 0.6 2.7 3.0 1.2 1.7
Parameter RDW PLT MPV
Assigned Values 0.0 0 0.0
Expected Range 1.5 25 2.0
F1-Help F2-Choice lists F4-Print F9-Menu F10-Save/Esc
06/05/93 11:38 OPR DMS PR TK HC DB XB WL HWL QC 32

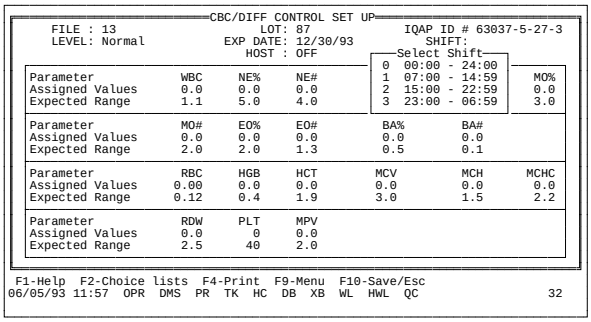
The cursor is in the LOT field. Enter the lot number and press **Enter**. With 5C cell control, the system automatically enters the level and the Expected Ranges entered in Set up based on the first two digits of the lot number:

86 - Abnormal II
87 - Abnormal I
88 - Normal

You can adjust the Expected Range by moving the cursor to the appropriate field and entering new numbers.


CBC/DIFF CONTROL SET UP
FILE : 13
LOT: 87
IQAP ID # 63037-5-27-3
LEVEL: Abnormal I
EXP DATE: / /
SHIFT:
HOST : OFF
OPR:
Select Level
Normal
Abnormal I
Abnormal II
Paramete
Assigned
Expected
NE% NE# LY% LY# MO%
0.0 0.0 0.0 0.0 0.0
5.0 4.0 5.0 2.5 3.0
Parameter MO# EO% EO# BA% BA#
Assigned Values 0.0 0.0 0.0 0.0 0.0
Expected Range 2.0 2.0 1.3 0.5 0.1
Parameter RBC HGB HCT MCV MCH MCHC
Assigned Values 0.00 0.0 0.0 0.0 0.0 0.0
Expected Range 0.12 0.4 1.9 3.0 1.5 2.2
Parameter RDW PLT MPV
Assigned Values 0.0 0 0.0
Expected Range 2.5 40 2.0
F1-Help F2-Choice lists F4-Print F9-Menu F10-Save/Esc
06/05/93 11:56 OPR DMS PR TK HC DB XB WL HWL QC 32

The LEVEL field was automatically filled in when you entered the lot number. When you move the cursor to the LEVEL field, a window appears. If you want to change the level, put the cursor on the level you want and press **Enter**. The entry in this field appears in the Select File window under Level.

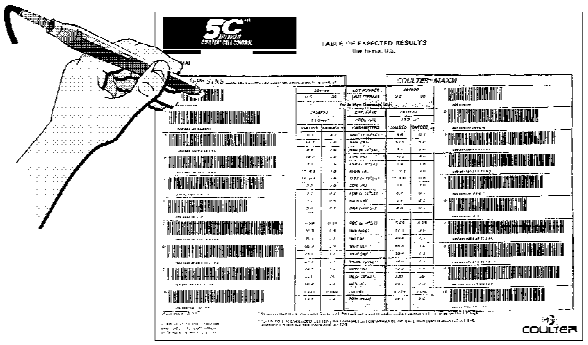

CBC/DIFF CONTROL SET UP
FILE : 13
LOT: 87
IQAP ID # 63037-5-27-3
LEVEL: Normal
EXP DATE: 12/30/93
SHIFT:
HOST : OFF
OPR:
Select Shift
0 00:00 - 24:00
1 07:00 - 14:59
2 15:00 - 22:59
3 23:00 - 06:59
Parameter WBC NE% NE# MO%
Assigned Values 0.0 0.0 0.0 0.0
Expected Range 1.1 5.0 4.0 3.0
Parameter MO# EO% EO# BA% BA#
Assigned Values 0.0 0.0 0.0 0.0
Expected Range 2.0 2.0 1.3 0.5 0.1
Parameter RBC HGB HCT MCV MCH MCHC
Assigned Values 0.00 0.0 0.0 0.0 0.0 0.0
Expected Range 0.12 0.4 1.9 3.0 1.5 2.2
Parameter RDW PLT MPV
Assigned Values 0.0 0 0.0
Expected Range 2.5 40 2.0
F1-Help F2-Choice lists F4-Print F9-Menu F10-Save/Esc
06/05/93 11:57 OPR DMS PR TK HC DB XB WL HWL QC 32

Enter the expiration date, then move to the SHIFT: field. A window appears with the shift selections that were entered in the Shift Set Up mode. Select the shift you want and press **Enter**.

In the HOST field, press **space bar** to toggle setting to ON or OFF. If AutoTransmit is turned on (from **F5** **Other** in Main Menu or Run Samples), setting this HOST field to ON enables automatic transmission of each control as it is run.

Enter your operator ID.

Enter the Assigned values from the assay sheet. When you run the control, results are compared to these values and flagged if they exceed the expected ranges.




7188067A

If your system includes a bar-code wand, you can enter the setup data for 5C cell control by passing the wand over the bar-coded fields of the assay sheet. Be sure to enter field number one, Lot number, first. When you use the wand, the cursor on the DMS screen does not move, and there is no highlighting. To use the bar-code wand:

1. Hold the bar-code wand like you would hold a pencil.

2. Place the wand in section 1, Lot No. **This section must be read first.**

3. Gently slide the wand back and forth over the bar-code until you hear a beep. The lot number is now in the Lot: field on the CONTROL SET UP screen.

   If the bar-code wand does not read a bar-code section, the DMS emits a beep. Scan that section again.

4. Follow the above procedure for the Expiration Date and Assigned Values.

5. Manually, enter Shift and Operator ID.

6. After all fields are filled, check the entries. If correct, press

   **F10 Save/Esc**

   to save the entries.

   If you enter a value manually and then use the bar code to scan that value, the scanned bar-code value overwrites the manually entered value.

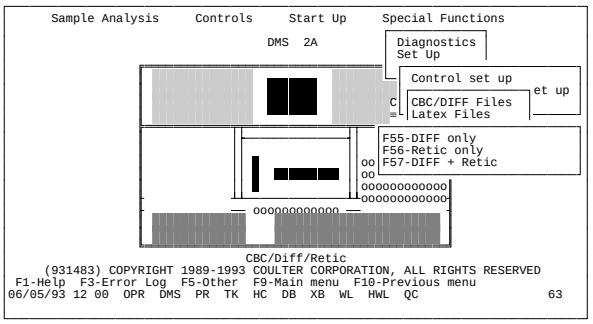
The parameters for the CBC/DIFF Control Set Up, Control Run and Control Review/Report screens are:

| | |
|---|---|
| RBC | WBC |
| HGB | NE% |
| HCT | NE# |
| MCV | LY% |
| MCH | LY# |
| MCHC | MO% |
| RDW | MO# |
| PLT | EO% |
| MPV | EO# |
| *PCT | BA% |
| *PDW | BA# |

* Available for international and research use only.

## LATEX FILE SET UP

**Special Functions**
**Set Up**
**Control set up**
**Latex Files**

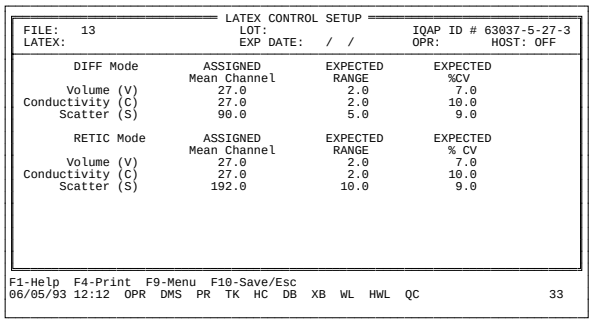



The modes available are:

F55 - DIFF only
F56 - Retic only
F57 - DIFF+Retic

Select the mode you want and press **Enter**.

The screen changes to the Select File window, with the cursor on the first file that is not set up. Press **Enter**.


LATEX CONTROL SETUP
FILE: 13
LOT:
IQAP ID # 63037-5-27-3
LATEX:
EXP DATE: / /
OPR: HOST: OFF
DIFF Mode ASSIGNED Mean Channel EXPECTED RANGE EXPECTED %CV
Volume (V) 27.0 2.0 7.0
Conductivity (C) 27.0 2.0 10.0
Scatter (S) 90.0 5.0 9.0
RETIC Mode ASSIGNED Mean Channel EXPECTED RANGE EXPECTED % CV
Volume (V) 27.0 2.0 7.0
Conductivity (C) 27.0 2.0 10.0
Scatter (S) 192.0 10.0 9.0
F1-Help F4-Print F9-Menu F10-Save/Esc
06/05/93 12:12 OPR DMS PR TK HC DB XB WL HWL QC 33

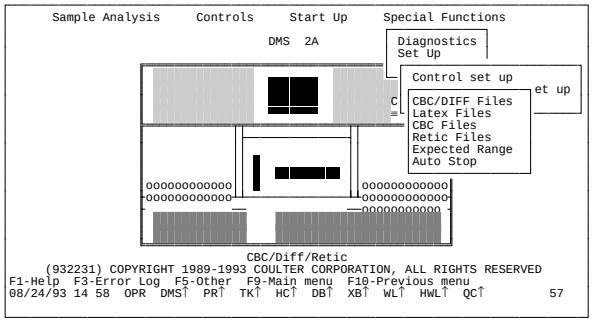
Enter the file name, lot number, expiration date, and operator ID in the appropriate fields. For LATRON, the system automatically enters default values for Assigned Mean Channel, Expected Range and Expected %CV. You can adjust the default values if necessary; refer to the LATRON package insert.

In the HOST field, press space bar to toggle setting to ON or OFF. If AutoTransmit is turned on (from F5 **Other** in Main Menu or Run Samples), setting this HOST field to ON enables automatic transmission of each control as it is run.

When you have verified that all entries are correct, press F10 to save them.

## CBC FILE SET UP

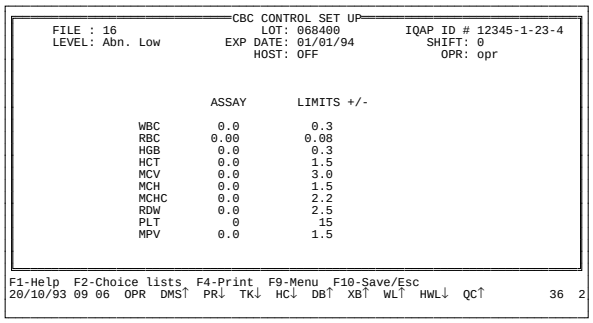
**Special Functions**
**Set Up**
**Control set up**
**CBC Files**
**Select File**




Use this mode for 4C PLUS cell control or equivalent. The levels available are:

Low
Normal
High

In the Select File window the cursor goes to the first file that is not set up. Press Enter to open the file.




The cursor is in the LOT field. Enter the lot number and press Enter. With 4C PLUS cell control, the system automatically enters the level and the Expected Ranges entered in Set up based on the first two digits of the lot number:

06 - Low
07 - Normal
08 - High

You can adjust the Expected Range by moving the cursor to the appropriate field and entering new numbers.

The LEVEL field was automatically filled in when you entered the lot number. When you move the cursor to the LEVEL field, a window appears. If you want to change the level, put the cursor on the level you want and press **Enter**. The entry in this field appears in the Select File window under Level.

Enter the expiration date, then move to the SHIFT: field. A window appears with the shift selections that were entered in the Shift Set Up mode. Select the shift you want and press **Enter**.

In the HOST field, press **space bar** to toggle setting to ON or OFF. If AutoTransmit is turned on (from **F5** **Other** in Main Menu or Run Samples), setting this HOST field to ON enables automatic transmission of each control as it is run.

Enter your operator ID.

Enter the Assigned values from the assay sheet. When you run the control, results are compared to these values and flagged if they exceed the expected ranges.

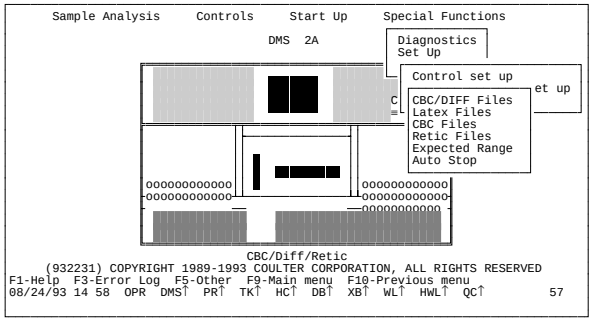
After all fields are filled, check the entries. If correct, press

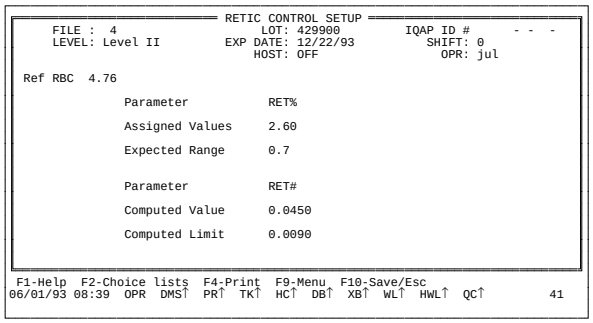
**F10** **Save/Esc**

to save the entries.

# RETIC FILE SET UP

**Special Functions**
**Set Up**
**Control set up**
**Retic Files**
**Select File**




The levels available are:

Level I
Level II
Level III

In the Select File window, the cursor is on the first file that is not set up. Press **Enter** to open the file.

Enter the lot number. and press **Enter**. For Retic-C cell control, the system automatically enters the level and the expected Ranges based on the first two digits of the lot number:

31 - Level I
42 - Level II
53 - Level III

If the expected ranges on the control's assay sheet are different from the DMS default values, or if your laboratory has established its own Expected Ranges, enter them before you set up your control file.

The LEVEL field was automatically filled in when you entered the lot number. When you move the cursor to the LEVEL field, a window appears. If you want to change the level, put the cursor on the level you want and press **Enter**. The entry in this field appears in the Select File window under Level.

Enter the expiration date, then move to the SHIFT: field. A window appears with the shift selections that were entered in the Shift Set Up mode. Select the shift you want and press **Enter**.

In the HOST field, press space bar to toggle setting to ON or OFF. If AutoTransmit is turned on (from F5 **Other** in Main Menu or Run Samples), setting this HOST field to ON enables automatic transmission of each control as it is run.

Enter your operator ID.

If your laboratory routinely reports Reticulocyte absolute number, in the Ref. RBC field, enter the reference RBC count from the assay sheet for the appropriate level. Enter the Assigned Value for RET% from the assay sheet. The RET# value and limit are automatically computed.

When you have verified that all entries are correct, press F10 to save them.

## HOW CELL CONTROLS ARE PROCESSED

There are four ways a cell control can be processed. All four apply to 5C cell control. The third and fourth apply to Retic-C cell control. The second and fourth apply to 4C PLUS cell control.

1. In the Primary mode with a control bar-code ID, and the bar-code is read.

2. In the Primary mode
   - with a bar-code ID that is not read, or
   - without a bar-code ID.

3. In the Secondary mode with the control ID entered on the Diluter keypad.

4. In the Secondary mode with a noncontrol ID entered on the Diluter keypad.

For a control ID number to match a control file, it must:

- have the same lot number and level as that in an existing control file, and

- be run in the shift for which the control file was set up.

Table 11 describes where results go in these circumstances, depending on the DMS display and on whether the ID read by the STKS matches an ID in a set up DMS control file.

**Table 11 Where Control Results Go**

| STKS Analyzer | | DMS Display | |
|---|---|---|---|
| | | CONTROL RUN screen for type of control being run | Any other screen |
| Primary Mode with Control bar-code ID read<br>or<br>Secondary Mode with a Control ID | Match | Matching control file | |
| | No Match | Current control file | Discard |
| Primary Mode with control bar-code ID not read, or no bar-code label<br>or<br>Secondary Mode with a non-control ID | | Current control file | Data base |

## QC STATUS

The QC field is at the far right of the Status line, which appears at the bottom of the DMS display.

In addition to the status of Auto-Stop, the foreground/background colors of QC indicate the status of the last control run, as shown below.

| Foreground/Background Colors | Indication |
|---|---|
| Blue/White | Last control run results were within assay value range and control is current. |
| Blue/Yellow | Receiving a control run. |
| Bright White/Red | Last control run had an error condition; see Control Error Conditions. |

## CONTROL ERROR CONDITIONS

If an error condition occurs on a control run, a message appears on the Error Line at the bottom of the screen. For CBC, CBC/DIFF and Retic controls, if the Auto-Stop option is ON, the system stops. If the Auto-Stop option is OFF, the system continues. The QC background on the Status line is red. Error conditions are:

- Disk drive is full
- File not found
- File is full
- Control out of range
- Control expired
- Control file almost full
- Error reading file
- Error writing file
- File has no data available
- Unable to archive file

You must acknowledge these conditions by pressing Alt Esc.

A control ID is either a bar-code label or a number entered on the Diluter keypad. If the bar-code label is read, or the appropriate number is entered on the Diluter keypad, the control is identified. If the bar-code label is not read, or the appropriate number is not entered on the Diluter, the control is not identified.

The following are error conditions and related messages for controls:

**Disk Drive is Full.**

- There is not enough space in disk drive C: of the computer to store results.

- The data is discarded if the control was identified; if the control was not identified, the data is saved in the data base.

- If the control was not identified and a Control Run file is on display, the data is lost.

Example:

*DISK DRIVE IS FULL, CANNOT SAVE CONTROL RUN*

**File not Found** (CBC/DIFF and Retic controls only)

- A control was identified but there is no control file set up.
- There is no file with this lot number.
- There is a file with this lot number, but the shift number does not match.
- If the currently displayed screen is a CBC/DIFF or RETIC CONTROL RUN, the run data is saved to that file. Otherwise, the control data is lost.

Example:

*FILE FOR CONTROL LOT # 870123 NOT FOUND. OR SHIFT # DID NOT MATCH.*

**Control File Almost Full**

- Space remains in the file for only five or less control run results.

Example:

*CONTROL FILE 11, Normal. ONLY 5 RUNS LEFT*

**File is Full**

- The file exists, but after five *File almost full* messages, now contains 100 runs.

- Control run data is lost if control was identified. If control was not identified, the data is saved to the data base.

- To store new control runs, delete the last run(s) or the file.

Example:

*CONTROL FILE 11, Normal, IS FULL*

**Control out of Range**

- The file exists and is not full, but one or more of the last control run results is out of the expected value range.

- Control run data is saved in the file.

Example:

*CONTROL FILE 4, Abnormal I, IS OUT OF RANGE*

**Control Expired**

- The file exists and is not full, but the control date has expired.

- Control run data is saved in the file.

Example:

*CONTROL FILE 2, Abnormal II, IS EXPIRED (11/21/93)*

If a Stop condition occurs when Auto-Stop is on, the Analyzer CRT displays the message *Check DMS Status*. You can:

- Take appropriate action to correct the cause of the error.

- Clear the error line and restart by pressing

Alt and Esc then START/ CONT

- Or turn the Auto-Stop option off by selecting

**Special Functions**
**Control Set Up**
**AutoStop**

**Lot and Shift Number are in Conflict**

- During control setup:

  - A control file with the same lot number and shift already exists.

Example:

*Lot number & shift are duplicated in another file.*

  - A control file with the same lot number and shift 0 (24 hour shift) already exists.

Example:

*The same lot number with shift 0 exists in another file.*

  - A control file with the same lot number and either shifts 1, 2 or 3 already exists.

Example:

*The same lot number with shift 1, 2 or 3 exists in another file.*

**Error Reading Control File**

- The control file is corrupt.

Example:

*Error reading record 1, Control File 11.*

**Error Writing Control File**

- The control file is corrupt.

Example:

*Error reading record 1, Control File 11.*

**Control file has no Data Available**

- The control file cannot print graphics because it lacks data.

Example:

*Control Graph File 1, Run number 50 No Data Available.*

**Unable to archive control file**

- There is no floppy disk in drive A.
- The floppy disk is not formatted.

Example:

*Unable to archive CONTROL file1.WKS*

- The floppy disk inserted in drive A: has no space available.

Example:

*No space available to archive CONTROL file in Drive A.*

The following flowchart shows what causes the error messages.

Table 12 lists the error messages, the system and data status with appropriate action.

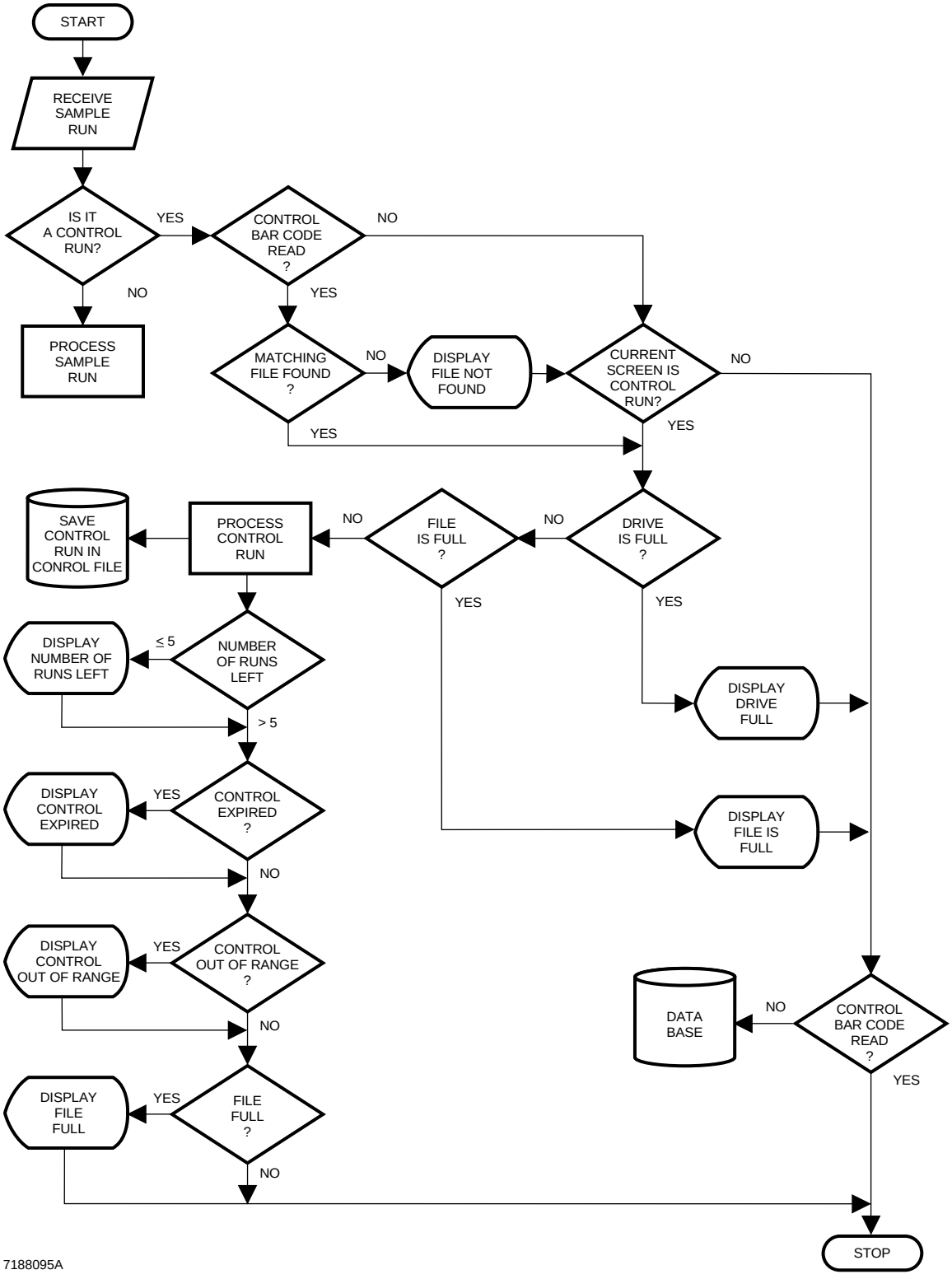

START
RECEIVE SAMPLE RUN
IS IT A CONTROL RUN?
YES
NO
CONTROL BAR CODE READ ?
NO
YES
PROCESS SAMPLE RUN
MATCHING FILE FOUND ?
NO
DISPLAY FILE NOT FOUND
CURRENT SCREEN IS CONTROL RUN?
NO
YES
YES
SAVE CONTROL RUN IN CONROL FILE
PROCESS CONTROL RUN
NO
FILE IS FULL ?
NO
DRIVE IS FULL ?
YES
YES
DISPLAY NUMBER OF RUNS LEFT
≤ 5
NUMBER OF RUNS LEFT
> 5
DISPLAY DRIVE FULL
DISPLAY CONTROL EXPIRED
YES
CONTROL EXPIRED ?
NO
DISPLAY FILE IS FULL
DISPLAY CONTROL OUT OF RANGE
YES
CONTROL OUT OF RANGE ?
NO
DATA BASE
NO
CONTROL BAR CODE READ ?
YES
DISPLAY FILE FULL
YES
FILE FULL ?
NO
STOP
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**Table 12 Control Error Message Status and Action**

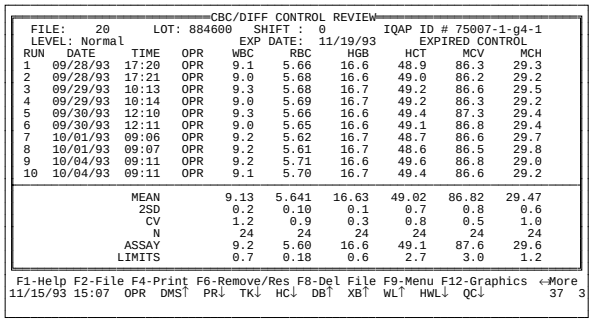
| Message | System Status | Data Status | Action |
|---|---|---|---|
| Disk Drive Full | System Continues or Auto-Stop (optional) | • Identified results lost.<br>• Unidentified results saved in data base.<br>• A Control Run screen is on display, unidentified, results lost. | 1. Delete control files to create space. |
| File Full | • System Continues or Auto-Stop (optional)<br>• A Control Run screen is on display, unidentified control, results lost. | Identified results lost. Unidentified results saved in data base. | 1. Print file, if necessary<br>2. Delete file.<br>3. Rerun control. |
| File not Found | System Continues or Auto-Stop (optional) | Identified results saved if CBC/DIFF or Retic Control Run screen is displayed. Otherwise, results are lost. | 1. Review file setup.<br>2. Correct error.<br>3. Rerun control. |
| Control Expired | System Continues or Auto-Stop (optional) | Results in Control file | 1. Review file setup.<br>2. Verify Lot # & Exp. date. Correct error. |
| File Out of Limits | System Continues or Auto-Stop (optional) | Results in Control file | 1. Review results.<br>2. Follow your laboratory's protocol. |
| Control File Almost Full | System continues until file is full. | Results in Control file | 1. Print file when necessary. |
| Lot and Shift number are in conflict | Unable to set up Control file. Occurs only during set up. | N/A | 1. Review file set up.<br>2. Correct error.<br>3. Assign a non-conflicting lot # or shift. |
| Error Reading File | System Stops | Data Lost | 1. Power off/on.<br>2. If error recurs, call Coulter Customer Operations. |
| Error Writing File | System Stops | Data Discarded | 1. Power off/on.<br>2. If error recurs, call Coulter Customer Operations. |
| | | | *continued* |

**Table 12 Control Error Message Status and Action**

| Message | System Status | Data Status | Action |
|---|---|---|---|
| *continued* | | | |
| Unable to archive | System continues | No data lost | 1. Verify formatted disk in Drive A.<br>2. Verify room on disk. |
| No space available | System continues | No data lost | Verify room on disk. |
| File has no data available | System continues | Control file stores graphics for the last 50 runs. | No graphic data is available. |

## CBC/DIFF CONTROL FILE REVIEW

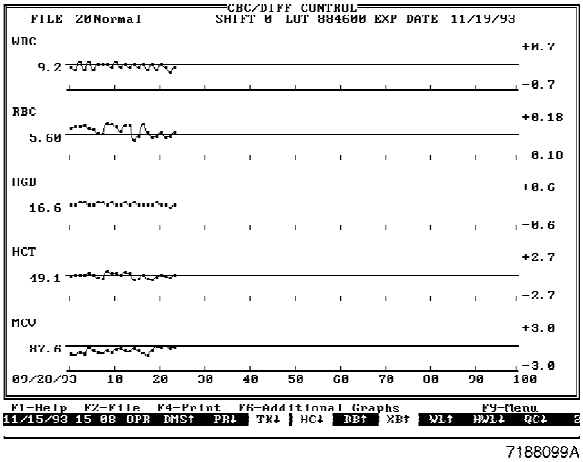
**Controls**
**Review or Report**
**F2 File**




Move the cursor to the file you want, and press **Enter**.

To review additional results, press ← or →.

All controls that you cycle in the Secondary mode display an S after the time.

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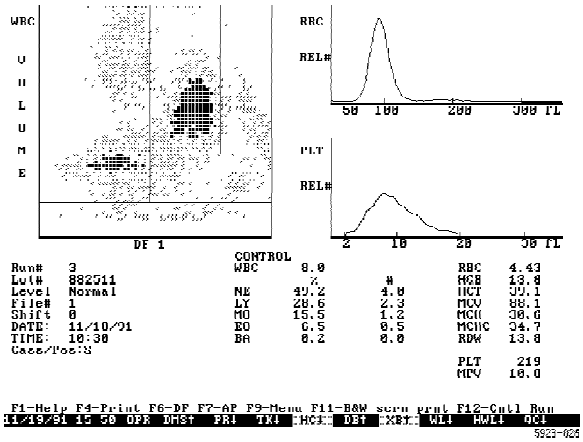
To view CBC/DIFF Control graphs, go back to the Control menu window, set the cursor to **Graphs**, and press **Enter**.

To view graphs of other parameters, press **F6 Additional Graphs**.

To view graphs of a different file, press **F2 File**, select the file you want, and press **Enter**.

## CBC/DIFF CONTROL GRAPHICS DISPLAY



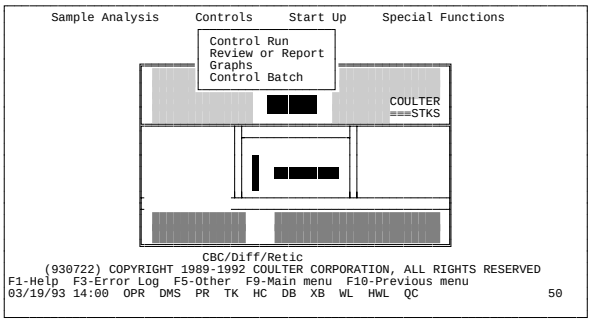

From either the CBC/DIFF CONTROL RUN screen or the CBC/DIFF CONTROL REVIEW screen, you can go to the CBC/DIFF control graphics screen by pressing

F12

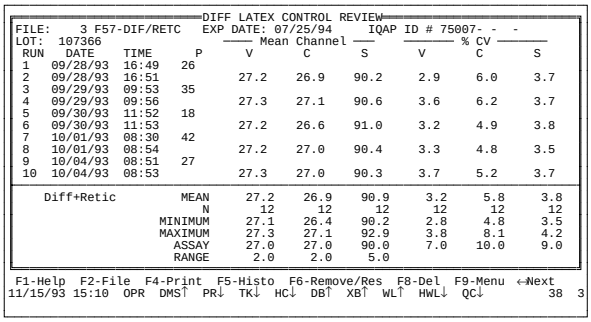
This screen, like the Sample Analysis screen, shows the graphic representation of the CBC/DIFF control, the control identification data and parameter results. It also displays H (high) and L (low) flags, based on assay values, if they occur. The system stores graphics data for the last 50 runs.

## LATEX CONTROL FILE REVIEW

**Controls**
**Review or Report**
**F2 File**

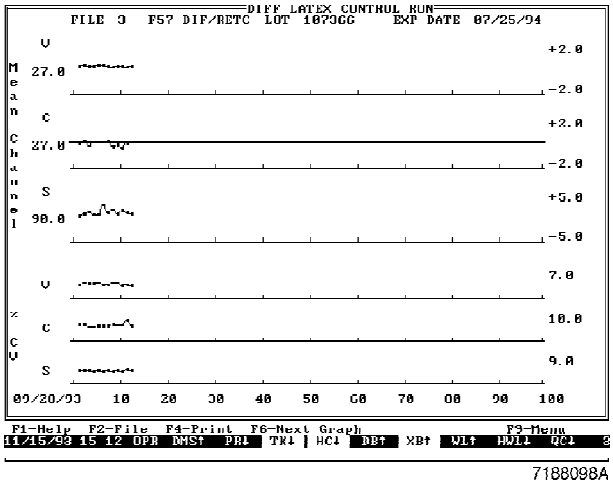



Move the cursor to the file you want and press Enter.




Use ↑ and ↓ to scroll through results. The P column is the Primer result.

If you are in the Diff + Retic mode, use ← or → to toggle between them.

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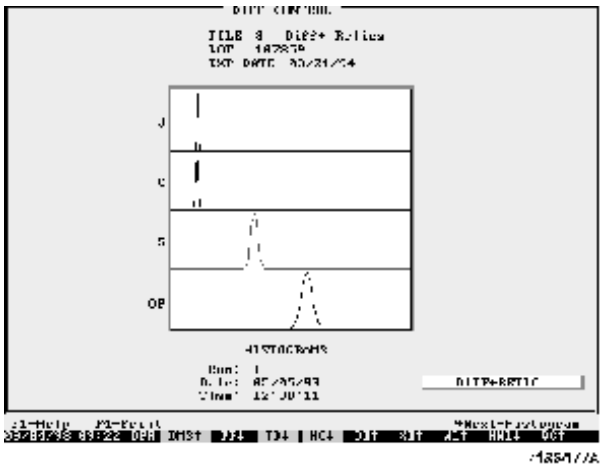
To review the Control graphs press

DMS Esc

Set the cursor to **GRAPHS** and press Enter.

The Mean Channel and %CV graphs appear.



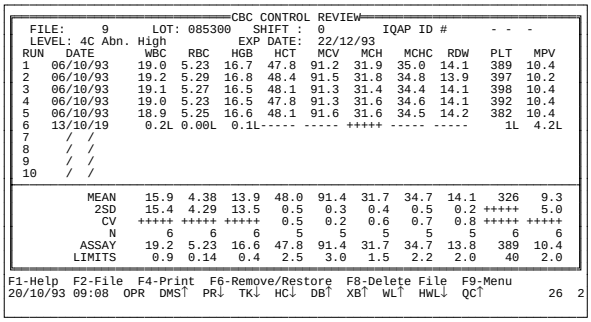

To review single parameter histograms of Volume, Conductivity, Scatter and Opacity from either the DIFF or RETIC LATEX CONTROL RUN screen or the DIFF or RETIC LATEX CONTROL REVIEW screen, press

DMS F5

LATRON primer histograms are available, but are used for Service troubleshooting only.

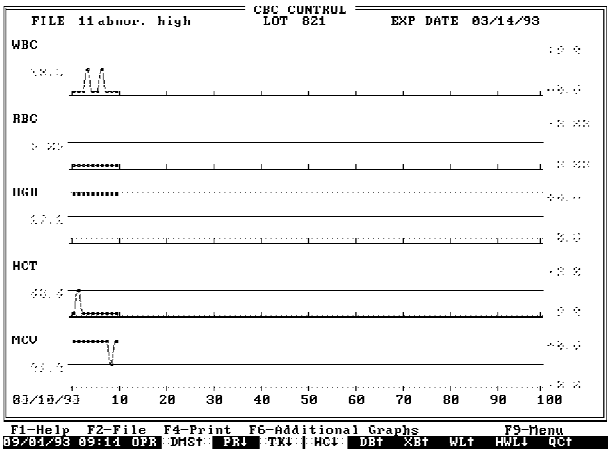
# CBC CONTROL FILE REVIEW

**Controls**
**Review or Report**
**F2 Select File**




Use the cursor to select the file you want, then press **Enter**.

Use ↑ and ↓ to scroll through results.

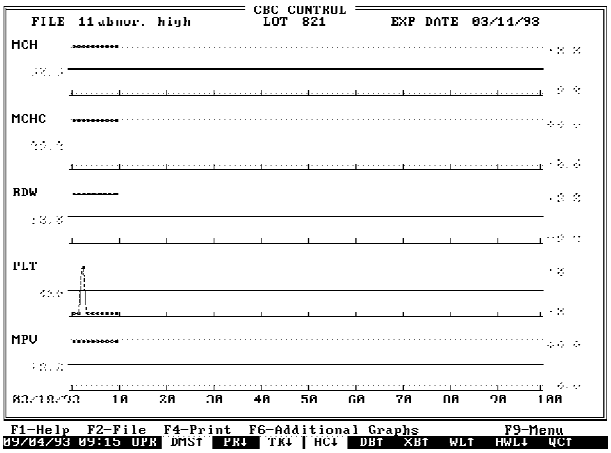

CBC CONTROL
FILE 11abnor. high LOT 821 EXP DATE 03/14/93
WBC
RBC
HGH
HCT
MCV
03/10/93 10 20 30 40 50 60 70 80 90 100
F1-Help F2-File F4-Print F6-Additional Graphs F9-Menu
09/04/93 09:11 OPR DMS↑ PR↓ TK↓ HC↓ DB↑ XB↑ WL↑ HWL↓ QC↑

To view the CBC Control graphs go back to the Control menu window and set the cursor to **Graphs**; press

DMS **Enter** **F2** **File**

Set the cursor to the file you want and press **Enter**.

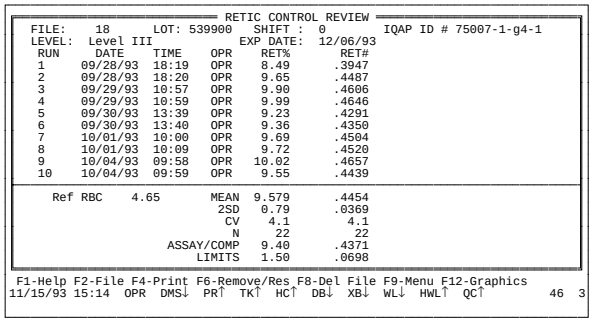
The control graphs for WBC, RBC, HGB, HCT and MCV appear.


CBC CONTROL
FILE 11abnor. high LOT 821 EXP DATE 03/14/93
MCH
MCHC
RDW
PLT
MPV
03/10/93 10 20 30 40 50 60 70 80 90 100
F1-Help F2-File F4-Print F6-Additional Graphs F9-Menu
09/04/93 09:15 OPR DMS↑ PR↓ TK↓ HC↓ DB↑ XB↑ WL↑ HWL↓ QC↑

To display the graphs for MCH, MCHC, RDW, PLT and MPV press **F6** **Additional Graphs**.

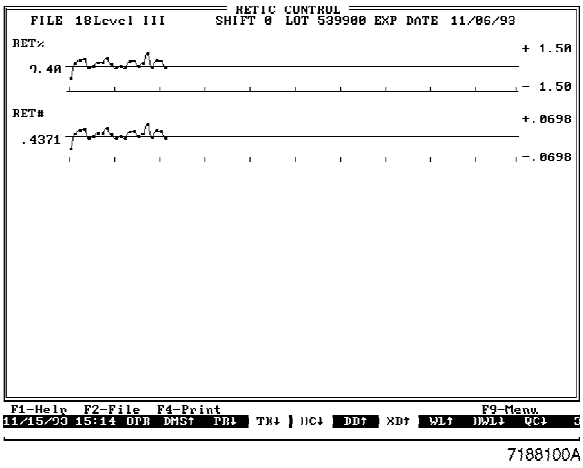
# RETIC CONTROL FILE REVIEW

**Controls**
**Review or Report**
**F2 File**




Move the cursor to the file you want and press **Enter**.

Use ↑ and ↓ to scroll through results.

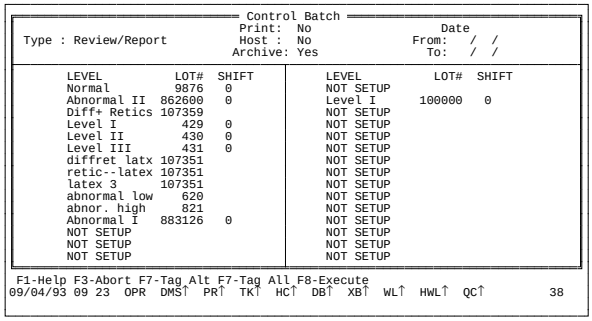



To view Retic control graphs, go back to the Control menu window, set the cursor to **Graphs**, and press **Enter**.

To view graphs of a different file, press **F2**, select the file you want, and press **Enter**.

# BATCH PROCESSING FOR CONTROLS

**Controls**
**Control Batch**

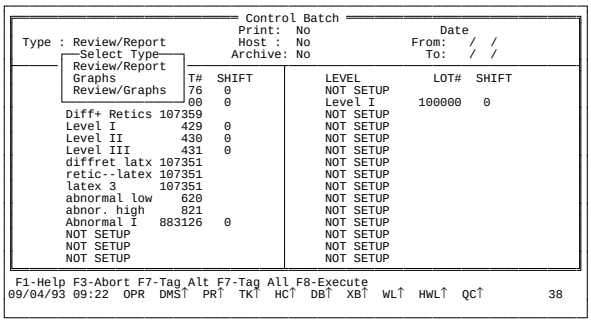



You can print, transmit and archive control files in batches.

There are three Types of batch processing:

- Review/Report
- Graphs
- Review/Graphs

You can batch print in all three Type options.




You can transmit to Host and archive only in Review/Report.

When you select Graphs or Review/Graphs, the cursor bypasses the date, Host and Archive fields.

1. When the cursor goes to the Type field, the Select Type window opens. Move the cursor to the type of files you want to process and press **Enter**.

2. Use **space bar** to toggle the Print, Host and Archive processes to Yes/No.

3. For Review/Report, you can set the Date From and To fields to batch process only data within the selected dates.

4. Press **F7** **Tag** or **Alt** **F7** **Tag All** to tag the files to be included in the batch.

5. If you are going to archive a batch, insert a formatted disk into the DMS disk drive.

6. Press **F8** **Execute** to begin the batch process.

7. Use **F3** **Abort** if you need to stop the batch process.

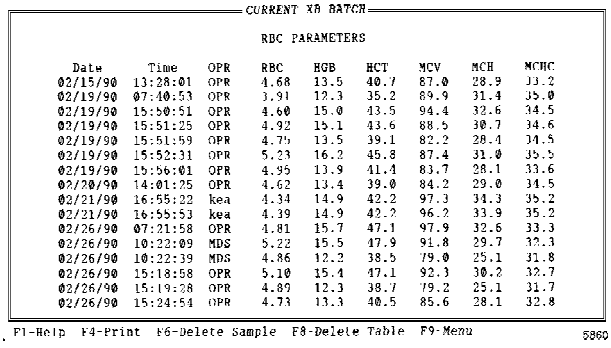
The archive feature lets you copy data from the DMS and retrieve it on another computer in a spreadsheet format. The spreadsheet program must be one that is compatible with the .WKS extension of the file name.

- The system uses the file number as the file name, for example, FILE3.WKS. Files 1-15 are on the left side of the screen, top to bottom. Files 16-30 are on the right side, top to bottom.

- If you archive a file on the same disk on which you have previously archived it, the earlier file is overwritten if it has the same file name.

If you batch print or archive an entire file, the statistical data is included. If you request only part of a file (for example, you define the batch by dates that do not encompass the entire file), no statistical data is included.

## $\bar{X}_B$ ANALYSIS



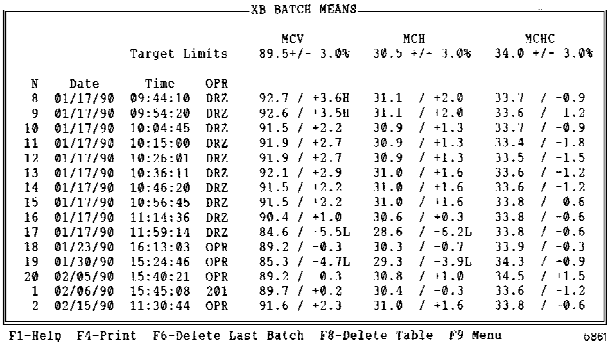
CURRENT XB BATCH

RBC PARAMETERS

| Date | Time | OPR | RBC | HGB | HCT | MCV | MCH | MCHC |
|---|---|---|---|---|---|---|---|---|
| 02/15/90 | 13:28:01 | OPR | 4.68 | 13.5 | 40.7 | 87.0 | 28.9 | 33.2 |
| 02/19/90 | 07:40:53 | OPR | 3.91 | 12.3 | 35.2 | 89.9 | 31.4 | 35.0 |
| 02/19/90 | 15:50:51 | OPR | 4.60 | 15.0 | 43.5 | 94.4 | 32.6 | 34.5 |
| 02/19/90 | 15:51:25 | OPR | 4.92 | 15.1 | 43.6 | 88.5 | 30.7 | 34.6 |
| 02/19/90 | 15:51:59 | OPR | 4.79 | 13.5 | 39.1 | 82.2 | 28.4 | 34.5 |
| 02/19/90 | 15:52:31 | OPR | 5.23 | 16.2 | 45.8 | 87.4 | 31.0 | 35.5 |
| 02/19/90 | 15:56:01 | OPR | 4.95 | 13.9 | 41.4 | 83.7 | 28.1 | 33.6 |
| 02/20/90 | 14:01:25 | OPR | 4.62 | 13.4 | 39.0 | 84.2 | 29.0 | 34.5 |
| 02/21/90 | 16:55:22 | kea | 4.34 | 14.9 | 42.2 | 97.3 | 34.3 | 35.2 |
| 02/21/90 | 16:55:53 | kea | 4.39 | 14.9 | 42.2 | 96.2 | 33.9 | 35.2 |
| 02/26/90 | 07:21:58 | OPR | 4.81 | 15.7 | 47.1 | 97.9 | 32.6 | 33.3 |
| 02/26/90 | 10:22:09 | MDS | 5.22 | 15.5 | 47.9 | 91.8 | 29.7 | 32.3 |
| 02/26/90 | 10:22:39 | MDS | 4.86 | 12.2 | 38.5 | 79.0 | 25.1 | 31.8 |
| 02/26/90 | 15:18:58 | OPR | 5.10 | 15.4 | 47.1 | 92.3 | 30.2 | 32.7 |
| 02/26/90 | 15:19:28 | OPR | 4.89 | 12.3 | 38.7 | 79.2 | 25.1 | 31.7 |
| 02/26/90 | 15:24:54 | OPR | 4.73 | 13.3 | 40.5 | 85.6 | 28.1 | 32.8 |

F1-Help F4-Print F6-Delete Sample F8-Delete Table F9-Menu

5860



XB BATCH MEANS

| | | | MCV | MCH | MCHC |
|---|---|---|---|---|---|
| | Target Limits | | 89.5+/- 3.0% | 30.5 +/- 3.0% | 34.0 +/- 3.0% |
| N | Date | Time | OPR | | | |
| 8 | 01/17/90 | 09:44:10 | DRZ | 92.7 / +3.6H | 31.1 / +2.0 | 33.7 / -0.9 |
| 9 | 01/17/90 | 09:54:20 | DRZ | 92.6 / +3.5H | 31.1 / +2.0 | 33.6 / -1.2 |
| 10 | 01/17/90 | 10:04:45 | DRZ | 91.5 / +2.2 | 30.9 / +1.3 | 33.7 / -0.9 |
| 11 | 01/17/90 | 10:15:00 | DRZ | 91.9 / +2.7 | 30.9 / +1.3 | 33.4 / -1.8 |
| 12 | 01/17/90 | 10:26:01 | DRZ | 91.9 / +2.7 | 30.9 / +1.3 | 33.5 / -1.5 |
| 13 | 01/17/90 | 10:36:11 | DRZ | 92.1 / +2.9 | 31.0 / +1.6 | 33.6 / -1.2 |
| 14 | 01/17/90 | 10:46:20 | DRZ | 91.5 / +2.2 | 31.0 / +1.6 | 33.6 / -1.2 |
| 15 | 01/17/90 | 10:56:45 | DRZ | 91.5 / +2.2 | 31.0 / +1.6 | 33.8 / -0.6 |
| 16 | 01/17/90 | 11:14:36 | DRZ | 90.4 / +1.0 | 30.6 / +0.3 | 33.8 / -0.6 |
| 17 | 01/17/90 | 11:59:11 | DRZ | 84.6 / -5.5L | 28.6 / -6.2L | 33.8 / -0.6 |
| 18 | 01/23/90 | 16:13:03 | OPR | 89.2 / -0.3 | 30.3 / -0.7 | 33.9 / -0.3 |
| 19 | 01/30/90 | 15:24:46 | OPR | 85.3 / -4.7L | 29.3 / -3.9L | 34.3 / +0.9 |
| 20 | 02/05/90 | 15:40:21 | OPR | 89.2 / -0.3 | 30.8 / +1.0 | 34.5 / +1.5 |
| 1 | 02/06/90 | 15:45:08 | 201 | 89.7 / +0.2 | 30.4 / -0.3 | 33.6 / -1.2 |
| 2 | 02/15/90 | 11:30:44 | OPR | 91.6 / +2.3 | 31.0 / +1.6 | 33.8 / -0.6 |

F1-Help F4-Print F6-Delete Last Batch F8-Delete Table F9 Menu

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$\bar{X}_B$ Analysis is a Quality Control method that monitors instrument performance by tracking the MCV, MCH and MCHC parameters of all patient samples. The method uses these specific indices because they tend to remain fairly stable, and because their values display little variance from patient to patient.

When $\bar{X}_B$ is On, as patient samples are cycled, the DMS stores their RBC results (RBC, Hgb, Hct, MCV, MCH, MCHC) in the $\bar{X}_B$ Current Batch mode.

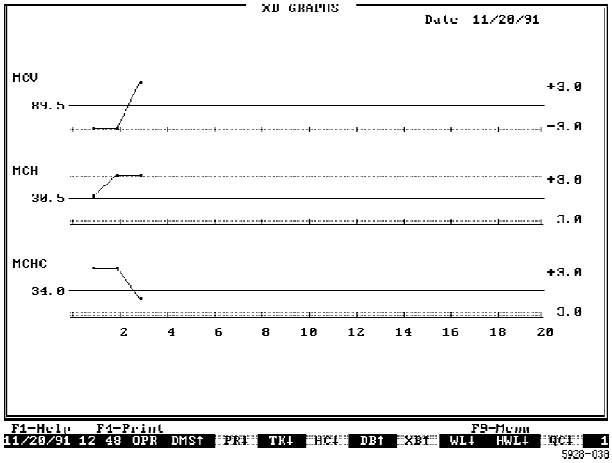
Partial aspirations are not included in $\bar{X}_B$ Analysis. When a batch of 20 samples has been collected, the DMS performs the $\bar{X}_B$ Analysis and calculates the batch mean of MCV, MCH and MCHC.

Use the Run Sample screen's option **F5 Other**, to turn $\bar{X}_B$ On/Off. When $\bar{X}_B$ Analysis is On, it is important to process samples randomly; for example, chemotherapy or neonate patient samples, if processed as a group, can cause $\bar{X}_B$ to be out.

The DMS compares the mean values with the target values and the percent limits. If the mean values are within the percent limits of the target values, then the $\bar{X}_B$ is IN; if any mean value exceeds the limits, the DMS flags it with an H or L, and the $\bar{X}_B$ is OUT. If the difference from the target value is greater than 9.95%, pluses (+++) are displayed. If the difference is less than –9.95%, minuses (---) are displayed. A white XB field on the Status line indicates IN; red indicates OUT. Investigate any batch that is OUT of the $\bar{X}_B$

limits, and record in your logbook. Remember that abnormal samples should be processed randomly.

When 20 batches of 20 samples have been collected, an automatic printout of the DMS Batch Means page occurs if F5 **AutoPrint** is set to All, Normals or Abnormals and *PR*↑ appears on the Status line.




The DMS also displays the batch means for each parameter in graph form. The lines on the graph are from point to point, but when printed on the Graphic Printer, a horizontal bar represents each mean.

You can delete individual samples from the batch. If a sample does not produce a numeric value for a parameter (for example, the result for that parameter was overrange, or voted out, or was an incomplete computation) then that sample is excluded from the calculations for that parameter, but the sample's values for the other parameters are used. If a sample's RBC value is less than $1 \times 10^6$, the DMS automatically excludes that sample from the calculations. The total number of deletes in a batch must not exceed 5, because the $\bar{X}_B$ formula must have at least 15 MCV, MCH and MCHC values in a batch for a valid calculation.

## MODE TO MODE

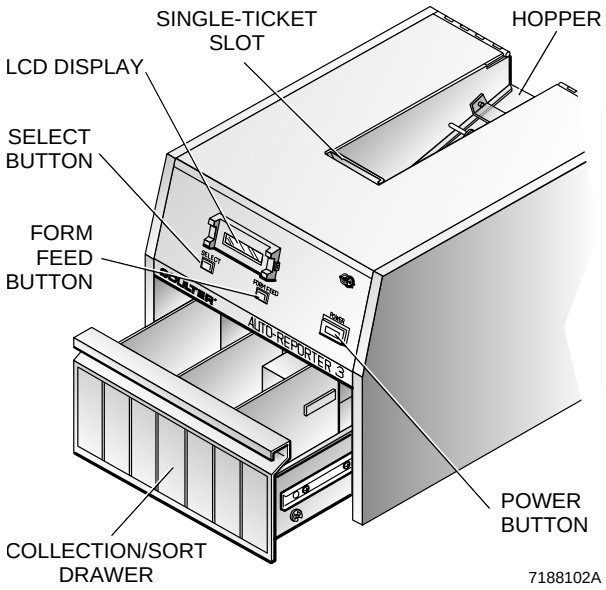
Coulter recommends that you perform quality-control checks using patient or commercial controls in both Primary and Secondary modes at intervals established by your laboratory. Investigate any failure to recover control values, within your laboratory's expected limits, or the presence of unexplained shifts or trends in either mode of analysis. If you cannot resolve control problems in either mode, contact your Coulter Representative.

5C® and 4C® PLUS cell controls are assayed only for the Primary mode. If you use the Secondary mode, your laboratory must determine its own means and expected ranges for each parameter.

# APPENDIX A
# AUTO-REPORTER 3

The COULTER AUTO-REPORTER 3 has two modes: HOPPER and SINGLE.

- In the HOPPER mode, you put a stack of up to 150 tickets in the hopper and results are printed automatically.
- In the SINGLE mode, you manually feed individual tickets into the single-ticket slot.




When you turn on the AUTO-REPORTER 3, it performs a series of internal tests, then displays the message HOPPER. If you want to change to the SINGLE mode, press **SELECT** on the AUTO-REPORTER 3 front panel.

The DMS drives the AUTO-REPORTER 3. The AUTO-REPORTER 3 has a bar-code reader that reads labels on the tickets and sends the label data to the DMS. The DMS sends back the corresponding results and the AUTO-REPORTER 3 prints the results on the ticket. Comments can be printed if they are entered in the Comment field in the demographics section.

The AUTO-REPORTER 3 does not print Reticulocyte results.

If you are collating CBC/Diff and Retic tests, and

- ID# 1 is the Positive identifier, and
- both tests have the same ID number

then you must run the CBC/Diff test first. If you run the Retic test first, the AUTOREPORTER 3 reads the ID and, since it does not print Retic results, produces a blank ticket.

If a partial aspiration occurs on a sample that has a ticket with a bar-code label, the ticket is ejected blank so that it can be reused.

## CONFIGURATION

To set the AUTO-REPORTER 3 configuration from the DMS,

1. Select

   **Special Functions**
   **Set Up**
   **System Set Up**
   **Communication Definition**
   **Autoreporter Definition**

2. Set the options to Yes or No, or On or Off, by using the spacebar to toggle the setting.

These options are available. They are described below.

| | |
|---|---|
| AUTOREPORTER BAR-CODE | : On/Off |
| TICKET HELD FOR RESULTS? | : Yes/No |
| SORT ALL FLAGGED TICKETS? | : Yes/No |
| DISABLE DIFF PRINT IF ANY FLAGS? | : Yes/No |

Set the AUTO-REPORTER 3 bar-code reader to On or Off. Note that you can also turn the AUTO-REPORTER 3 bar-code reader On/Off from the Main Menu F5 **Other** option.

- When the bar-code reader is on, the AUTO-REPORTER 3 reads the bar-code label on the ticket. The AUTO-REPORTER 3 displays the ID on its LCD display, then sends the data to the DMS. The DMS retrieves the corresponding results from its data base and sends them to the AUTO-REPORTER 3, where they are printed. If there is no bar-code label on the ticket, or if the AUTO-REPORTER 3 cannot read the label, the ticket is ejected.

---

**IMPORTANT**

**When the AUTO-REPORTER 3 bar-code reader is off, be sure to use tickets that do not have bar-code labels.**

---

- When the bar-code reader is off, use tickets without bar-code labels. The DMS sends results to the AUTO-REPORTER 3 as they become available. If a ticket with a bar-code label is detected, it is ejected. If a label is improperly placed on a ticket, and the AUTO-REPORTER 3 does not detect it, then the ticket is treated like it has no label; the next available results, including identification, from the DMS are printed on the ticket. What is printed on the ticket is correct, but these results and identification do not match the improperly placed, undetected bar-code label.

Set the AUTO-REPORTER 3 to hold tickets for results, Yes, or No.

- When set to Yes, if the DMS does not have the corresponding results in its data base, the ticket remains in the printing station until the results are available.

- When set to No, if the DMS does not have the corresponding results in its data base, the ticket is ejected and the next ticket feeds into the printing station.

Set the AUTO-REPORTER 3 to sort all flagged tickets, Yes or No. The flags are High (H), Low (L), Suspect and Definitive.

- When set to Yes, any ticket with any flag goes into the Sort drawer.

- When set to No, tickets with flags are not sorted.

Set the AUTO-REPORTER 3 to disable diff print if there are any flags, Yes or No.

- When set to Yes, if any parameter is flagged, no differential results are printed and the ticket goes into the sort drawer.

- When set to No, differential results, when available, are printed on the tickets.

## MESSAGES ON THE AUTO-REPORTER 3 DISPLAY

During operation of the AUTO-REPORTER 3, various messages may appear on the front panel display. Table 13 lists the messages, their causes, and the required operator action.

**Table 13 Messages on AUTO-REPORTER 3 Display**

| Message | Cause | Operator Action |
|---|---|---|
| Hopper empty<br>Load tickets<br>Press FORM FEED | The AUTO-REPORTER 3 is in the HOPPER mode and there are no tickets in the hopper. | 1. Put tickets into the hopper.<br>2. Press ⟨FORM FEED⟩ on the AUTO-REPORTER 3 front panel. |
| SINGLE<br>Insert ticket | The AUTO-REPORTER 3 is in the SINGLE ticket mode and there is no ticket in the single-ticket slot. | Insert a ticket in the slot. |
| Remove ticket | The AUTO-REPORTER 3 is in the HOPPER mode and there is a ticket in the single-ticket slot. | Remove the ticket from the single-ticket slot. |
| Check ticket<br>Press FORM FEED | The AUTO-REPORTER 3 is in the SINGLE ticket mode and you have inserted a ticket in the single-ticket slot while a ticket is printing. | 1. Remove the ticket from the single-ticket slot.<br>2. Press ⟨FORM FEED⟩.<br>3. Wait until the ticket has finished printing before you insert the next ticket. |
| | | *continued* |

**Table 13 Messages on AUTO-REPORTER 3 Display**

| Message | Cause | Operator Action |
|---|---|---|
| *continued* | | |
| Check tray<br>Press FORM FEED | There is an obstruction in the sorting drawer. | 1. Remove the obstruction.<br>2. Press ⟨FORM FEED⟩. |
| Clear path<br>Press FORM FEED | There is an obstruction in the ticket path under the printer mechanism. | 1. Remove the obstruction.<br>2. Press ⟨FORM FEED⟩. |
| Check scanner<br>or<br>Check print head<br>or<br>Ticket jammed | There is an obstruction at the indicated location. | 1. Turn off the AUTO-REPORTER 3.<br>2. Remove obstruction at indicated location.<br>3. Turn on the AUTO-REPORTER 3. |
| ROM test Uxx BAD<br>or<br>RAM test Uxx BAD | The internal memory test has found a bad location. | 1. Record the chip number (Uxx).<br>2. Call Coulter Customer Operations. |
| Waiting for data | The AUTO-REPORTER 3 is in the HOPPER mode. Data is sent from the DMS via (F2) but there is an obstruction in the sorting drawer. | 1. Remove the obstruction.<br>2. Press ⟨FORM FEED⟩. |
| ERROR XXXX | A fatal system error has occurred. | 1. Record the message (XXXX = four characters) and the circumstances immediately preceding the error message.<br>2. Call Coulter Customer Operations. |

## MESSAGES THAT PRINT ON THE AUTO-REPORTER 3 TICKET

The AUTO-REPORTER 3 prints the following messages on the ticket under the described circumstances. In all cases, if there is an ID#1, it is also included.

### CRC-ERROR

Data in the record for a sample was corrupted. Reprint the ticket. If that is not successful, rerun the sample.

## D (disabled checksum)

If the bar-code checksum is disabled in the STKS Analyzer, results printed on the AUTO-REPORTER 3 ticket have a "D" printed in the OP CODES field.

## E (edited)

If sample data has been edited, an "E" is printed on the ticket in the last space of the parameter edited.

If the nonselected Positive identifier has been edited, an "E" is printed on the ticket in either the Cass/pos or ID#1 field.

## LOCKED

There was a problem in the data base. Reprint the ticket. If that is not successful, reset the DMS (Special Functions/Set Up/Sample Analysis Set Up/Reset DMS), then reprint the ticket.

## M (manually printed ticket)

---

**IMPORTANT**

**If the last sample cycled has not yet been printed by the AUTO-REPORTER 3, its results are stored in the DMS Sample Analysis buffer. When you insert a ticket, these results are automatically printed before any other tickets are printed.**

---

To reprint a ticket access the sample in the data base, insert a ticket in the AUTO-REPORTER 3, and press F2. An "M" is printed in the OP CODES field on the ticket. It is the operator's responsibility to verify that the "M" is printed on the ticket, and that the sample identifiers and results match the DMS display.

## MULTI-ID

If this message occurs, press any key on the DMS keyboard to clear the message. This message occurs under the following circumstances:

1. The AUTO-REPORTER 3 setup is:

   Bar Code - On
   Hold Results - No

The AUTO-REPORTER 3 reads the bar-code label on a ticket, and sends it to the DMS. The DMS looks in the data base for a match. If the DMS finds more than one sample in the data base that matches the bar-code label on the ticket, and at least two of the samples have not had a ticket printed, then this message appears on the DMS Run Samples display:

*MULTIPLE SAMPLES WITH SAME ID IN DATA BASE*

The AUTO-REPORTER 3 prints the ID# and MULTI-ID message, but no results on the ticket. To print the sample results, insert a ticket with no bar-code label, sort the sample in the data base, then use F2 from Run Samples.

2. The AUTO-REPORTER 3 setup is:

   Bar Code - Off
   Hold Results - Yes

   There are blank tickets (no bar-code labels) in the AUTO-REPORTER 3. A sample with an ID#1 goes from the Analyzer to the DMS; the DMS compares the sample to the data base. If the DMS finds more than one sample in the data base with that ID#, and at least two have not had a ticket printed, then this message appears on the DMS Run Samples display:

   *MULTIPLE SAMPLES WITH SAME ID IN DATA BASE*

   The AUTO-REPORTER 3 prints the ID# and the MULTI-ID message on the ticket, but no results. To print the sample results, sort the sample in the data base, and use F2 from Run Samples.

## P (Positive identifier)

The AUTO-REPORTER 3 prints a "P" in the last space of the CASS/POS and/or ID field(s) to mark the selected Positive identifier(s).

## TAG-ERROR

An internal error in the data base prevents the ticket from being printed. Try to print the ticket again. If that is not successful, call Coulter Customer Operations.

## ?????

There was an internal error. Reprint the ticket. If that is not successful, rerun the sample.

## AUTO-REPORTER 3 TESTS

There are two AUTO-REPORTER 3 tests available via the DMS Special Functions/Diagnostics routine. Before you perform either test, place a ticket without a bar-code label into either the hopper or the single-ticket slot. At the DMS, set the AUTO-REPORTER 3 configuration to:

- Bar-code reader Off
- Hold Tickets: Yes

The two tests are:

- **Print test** - prints on the ticket all characters the AUTO-REPORTER 3 is capable of printing.

- **Sort Drawer test** - moves the sort section of the drawer back and forth, and automatically ejects the ticket.

## TO REPRINT A TICKET

---

**IMPORTANT**

**If the last sample cycled has not yet been printed by the AUTO-REPORTER 3, its results are stored in the DMS Sample Analysis buffer. When you insert a ticket, these results are automatically printed before any other tickets are printed.**

---

To reprint a ticket access the sample in the data base, insert a ticket in the AUTO-REPORTER 3, and press F2. An "M" is printed in the OP CODES field on the ticket. It is the operator's responsibility to verify that the "M" is printed on the ticket, and that the sample identifiers and results match the DMS display.

# APPENDIX B
# HEMOGARD CLOSURE MODIFICATION

## OPERATION CHANGES

There are three generations of tube processors that have been installed on new STKS Analyzers with Reticulocyte Analysis: standard glass tube with rubber stopper, HEMOGARD Closure modification, and Universal Tube Processor. If your system has the processor designed for use with Becton Dickinson's VACUTAINER Brand Tubes with HEMOGARD Closure, this Appendix explains how the tube processor affects operations. See Appendix D for additional information if your system has the Universal Tube Processing Module option.

On a system designed for use with HEMOGARD Closures, you can use both the new tubes with HEMOGARD Closure and the regular rubber stopper tubes. Special cassettes are provided for the HEMOGARD tubes. You can put both the regular cassettes and the special cassettes in the loading area at the same time.

The special cassette can hold tubes with HEMOGARD Closure that are 13 x 75 mm. Tubes that are 13 x 100 mm do not fit in the special cassette.

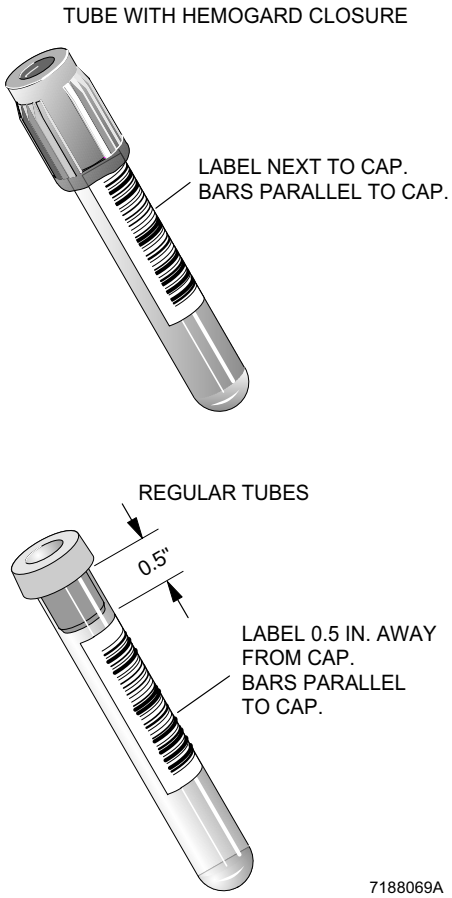
**When you run controls, use a regular cassette.** Coulter does not recommend using controls in the special cassettes. Although the controls fit in the special cassettes, they were not designed for use with them.

## BAR-CODE LABEL PLACEMENT

**IMPORTANT**

**Be sure to properly position the bar-code label for the type of tube you are using. Also, be sure to put only tubes with HEMOGARD Closure in the special cassettes, and only regular tubes in the regular cassettes. The scanner cannot read the label correctly if the label is put in the wrong position, or if a tube is in the wrong type of cassette.**

When your system is modified for tubes with HEMOGARD Closure, labels on regular tubes must be placed 0.5 in. down from the cap. Figure shows how to position a bar-code label on the new tubes with HEMOGARD Closure, and on the regular tubes with a modified system.



# APPENDIX C
# ADDITIONAL WBC DIFFERENTIAL QC TECHNIQUES

## QUALITY CONTROL

The STKS incorporates multiple QC techniques. Quality Assurance includes monitoring routine performance and service in conjunction with the use of controls and calibrators. The combination of these methods provides the assurance of complete quality control. For the CBC, CBC/DIFF and RETIC parameters, it uses the established technique of commercial controls. The STKS uses a stabilized particle suspension such as LATRON to verify flow cell alignment, gains and CVs for flow cell volume, conductivity and light scatter. Control files are stored in the DMS.

You can perform manual differentials as an additional measure of good Quality Control practice or as recommended by your laboratory, state and federal protocol.

## COMPARISON QC PROCEDURE

This method for controlling the quality of the STKS differential results uses a comparison of instrument output with carefully performed stained-film differentials. For recognition criteria for cell type reference, refer to "Reference Leukocyte Differential Count and Evaluation of Instrument Methods (H20-A)," Section 5, "Peripheral Blood Nucleated Cells to Be Included in the Differential Count," published by the National Committee for Clinical Laboratory Standards (NCCLS).

1. Collect two normal blood specimens according to NCCLS "Procedures for the Collection of Diagnostic Blood Specimens by Venipuncture (H3-A3)." You need a sufficient quantity of each specimen to cycle two times in the Primary Mode, and to make two slides. Do not use capillary specimens or specimens collected using microcollection devices. The two blood specimens must meet the following criteria:

    a. Whole blood collected in tripotassium ($K_3$)EDTA maintained at room temperature, with the proper proportion of blood to anticoagulant (1.5 mg/mL).

    b. Not less than 30 minutes and not more than 5 hours since draw.

    c. Within the reference range (Jones et al. 1985) of:

| | |
|---|---|
| Neutrophils | 40 to 72% |
| Lymphocytes | 17 to 45% |
| Monocytes | 4 to 12% |
| Eosinophils | 0 to 10% |
| Basophils | 0 to 1% |

2. Label the specimens "1" and "2."

3. Cycle each specimen two times in the Primary Mode; record the percent values. An example of a daily QC worksheet is given here. A blank worksheet is included in Appendix B of the Reference manual. You can make photocopies to use in your laboratory.

4. Make two slides of each specimen according to NCCLS H20-A.

5. For specimen number 1, use the worksheet to calculate the mean of the two STKS results for each parameter percent as follows:

   a. Total the two results.

   b. Divide the total by two; this result is the mean.

   c. Record this mean; this is the STKS 1 value.

6. Coulter recommends manual differentials be performed by two technologists, each doing a differential cell count for each sample. This reduces statistical error of the manual differential caused by imprecision. The imprecision is especially pronounced in cell populations with low numbers (Rumke 1978). The uncertainty of reference value recovery is a direct function of the number of cells counted in the differential cell count. Depending upon the acceptable range of variability as defined by your individual laboratory for numbers of cells counted, the uncertainty of reference value recovery increases as the number of cells counted decreases. See heading: 95% Confidence Limits in Differential Counts, at the end of this chapter.

   a. Give one slide of specimen number 1 to each of two technicians; have each technician perform a manual cell differential.

   b. Record the results on the daily worksheet.

   c. Calculate the mean of the two slides for each parameter.

   d. Record the mean; this is the Reference 1 value.

7. Repeat steps 5 and 6 for the second specimen to determine the values for STKS 2 and Reference 2.

8. Calculate the graph point for each parameter; use the following formula, and enter the result on the daily worksheet.

$$\text{Graph Point} = \frac{(\text{STKS 1} - \text{Ref 1}) + (\text{STKS 2} - \text{Ref 2})}{2}$$

COULTER® STKS

**DAILY QC WORKSHEET FOR THE STKS**

MONTH _____ DAY _____ YEAR _____

SPECIMEN 1

| CYCLE | NE% | LY% | MO% | EO% | BA% |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| TOTAL (Σ) | | | | | |
| Σ ÷ 2 = STKS 1 | | | | | |

| TECH | NE% | LY% | MO% | EO% | BA% |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| TOTAL (Σ) | | | | | |
| Σ ÷ 2 = REF 1 | | | | | |

SPECIMEN 2

| CYCLE | NE% | LY% | MO% | EO% | BA% |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| TOTAL (Σ) | | | | | |
| Σ ÷ 2 = STKS 2 | | | | | |

| TECH | NE% | LY% | MO% | EO% | BA% |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| TOTAL (Σ) | | | | | |
| Σ ÷ 2 = REF 2 | | | | | |
| GRAPH POINT | | | | | |

SERIAL NO. _____

$$\text{GRAPH POINT} = \frac{(\text{STKS 1} - \text{REF 1}) + (\text{STKS 2} - \text{REF 2})}{2}$$

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COULTER CORPORATION
Miami, FL

7182027A

## QC GRAPHS

Table 14 shows the neutrophil results for five days and the calculated graph points. The illustration shows an example of a monthly QC graph form for the five differential parameters; the five graph points from Table 5 have been entered in this example. Blank copies of the forms used in the comparative QC procedure are included in the Log Sheets Appendix in your Reference manual. You can make photocopies to use in your laboratory. If you prefer, use standard graph paper.

**Table 14 NE Results and Graph Points for Five Days**

| Day | STKS 1 | Ref 1 | STKS 2 | Ref 2 | Graph Point |
|---|---|---|---|---|---|
| 1 | 53.5 | 51.5 | 46.0 | 45.5 | 1.25 |
| 2 | 49.0 | 50.0 | 72.5 | 73.5 | -1.0 |
| 3 | 60.0 | 62.0 | 44.5 | 43.0 | -0.25 |
| 4 | 63.5 | 61.0 | 60.0 | 60.5 | 1.0 |
| 5 | 43.0 | 46.5 | 56.5 | 58.0 | -2.5 |

Enter on these graphs the graph points you calculated on the daily worksheet.

Use zero difference as the Mean, plus or minus two standard deviations (SD). The recommended target values for initial entry are:

| | 1 SD | 2 SD |
|---|---|---|
| NE | 3.26 | 6.52 |
| LY | 3.23 | 6.46 |
| MO | 1.26 | 2.52 |
| EO | 0.95 | 1.90 |
| BA | 0.40 | 0.80 |

When you accumulate 31 days' worth of values, calculate your own laboratory's mean and 2 SD values; 95% of your graph points should fall within these limits. If they do not, call Coulter Customer Operations.

COULTER® STKS

**MONTHLY QC GRAPHS**

MONTH _____

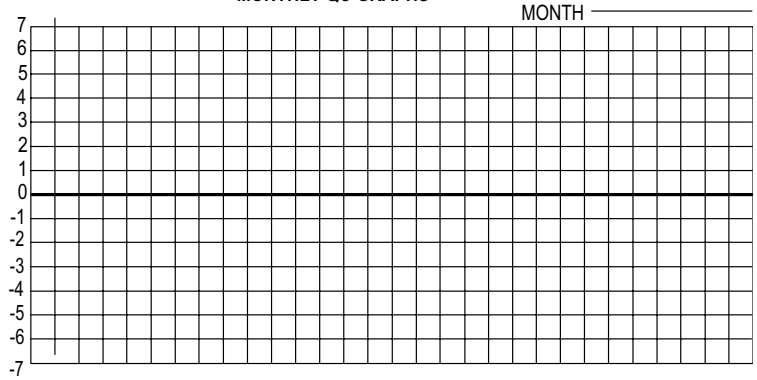
NE

2SD=+

1SD=+

1SD=-

2SD=-



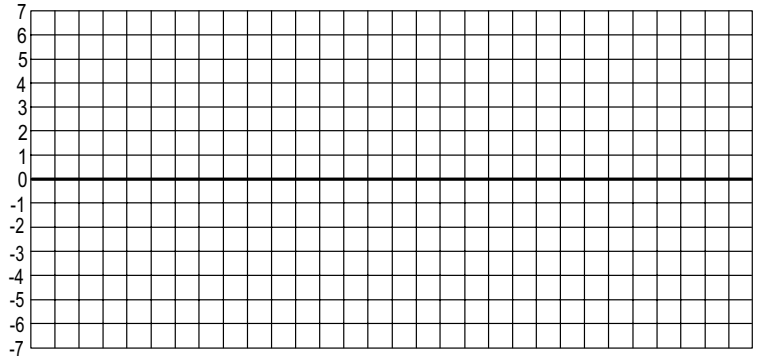

LY

2SD=+

1SD=+

1SD=-

2SD=-



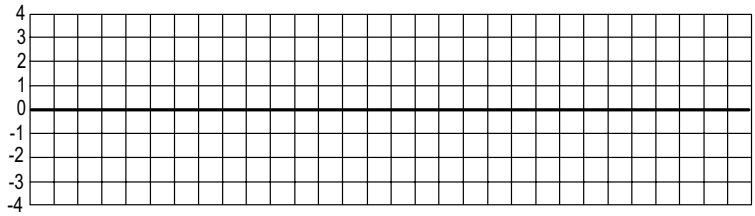

MO

2SD=+

1SD=+

1SD=-

2SD=-




EO

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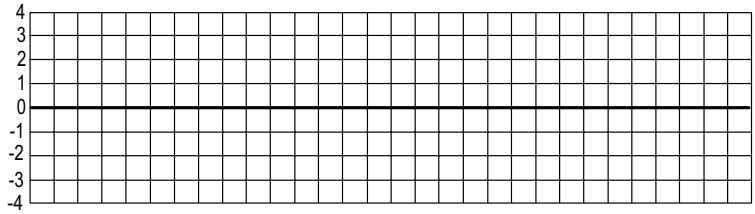
1SD=+

1SD=-

2SD=-




BA

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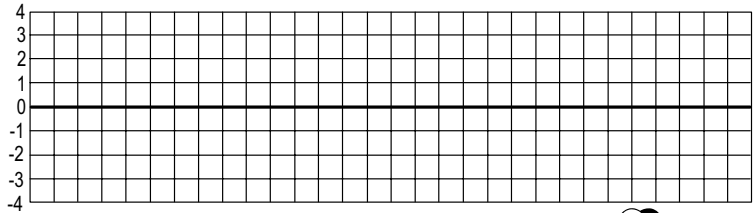
1SD=+

1SD=-

2SD=-




SERIAL NO. _____

COULTER

COULTER CORPORATION
Miami, FL

7182029A

## 95% CONFIDENCE LIMITS IN DIFFERENTIAL COUNTS

Table 15 defines 95% confidence limits for various percentages of blood cells as determined by differential counts.

**Example**: If 26 lymphocytes are observed in a 100-cell manual differential, the expected range of recovery is from 17 to 35 cells counted. Conversely, if 26 lymphocytes are observed in a 400-cell manual differential, the expected range of recovery is reduced to between 22 and 30 cells counted.

**Table 15 95% Confidence Limits**
**Percentages of Blood Cells as Determined By Differential Counts**

| Observed | n = 100 | n = 200 | n = 400 | n = 800 |
|---|---|---|---|---|
| 1 | 0 - 3 | 0 - 2 | 0 - 2 | 0 - 2 |
| 2 | 0 - 5 | 0 - 4 | 1 - 3 | 1 - 3 |
| 3 | 0 - 6 | 1 - 5 | 1 - 5 | 2 - 4 |
| 4 | 0 - 8 | 1 - 7 | 2 - 6 | 3 - 5 |
| 5 | 1 - 9 | 2 - 8 | 3 - 7 | 3 - 7 |
| 6 | 1 - 11 | 3 - 9 | 4 - 8 | 4 - 8 |
| 7 | 2 - 12 | 3 - 11 | 4 - 10 | 5 - 9 |
| 8 | 3 - 13 | 4 - 12 | 5 - 11 | 6 - 10 |
| 9 | 3 - 15 | 5 - 13 | 6 - 12 | 7 - 11 |
| 10 | 4 - 16 | 6 - 14 | 7 - 13 | 8 - 12 |
| 11 | 5 - 17 | 7 - 15 | 8 - 14 | 9 - 13 |
| 12 | 6 - 18 | 7 - 17 | 9 - 15 | 10 - 14 |
| 13 | 6 - 20 | 8 - 18 | 10 - 16 | 11 - 15 |
| 14 | 7 - 21 | 9 - 19 | 11 - 17 | 12 - 16 |
| 15 | 8 - 22 | 10 - 20 | 11 - 19 | 13 - 17 |
| 16 | 9 - 23 | 11 - 21 | 12 - 20 | 13 - 19 |
| 17 | 10 - 24 | 12 - 22 | 13 - 21 | 14 - 20 |
| 18 | 10 - 26 | 13 - 23 | 14 - 22 | 15 -21 |
| 19 | 11 - 27 | 14 - 24 | 15 - 23 | 16 - 22 |
| 20 | 12 - 28 | 14 - 26 | 16 - 24 | 17 - 23 |
| 21 | 13 - 29 | 15 - 27 | 17 - 25 | 18 - 24 |
| 22 | 14 - 30 | 16 - 28 | 18 - 26 | 19 - 25 |
| 23 | 15 - 31 | 17 - 29 | 19 - 27 | 20 - 26 |
| 24 | 16 - 32 | 18 -30 | 20 - 28 | 21 - 27 |
| | | | | *continued* |

**Table 15 95% Confidence Limits**
**Percentages of Blood Cells as Determined By Differential Counts**

| Observed | n = 100 | n = 200 | n = 400 | n = 800 |
|---|---|---|---|---|
| *continued* | | | | |
| 25 | 16 - 34 | 19 - 31 | 21 - 29 | 22 - 28 |
| 26 | 17 - 35 | 20 - 32 | 22 - 30 | 23 - 29 |
| 27 | 18 - 36 | 21 - 33 | 23 - 31 | 24 - 30 |
| 28 | 19 - 37 | 22 -34 | 24 - 32 | 25 - 31 |
| 29 | 20 - 38 | 23 - 35 | 25 - 33 | 26 - 32 |
| 30 | 21 - 39 | 24 - 36 | 25 - 35 | 27 - 33 |
| 31 | 22 - 40 | 25 - 37 | 26 - 36 | 28 - 34 |
| 32 | 23 - 41 | 25 - 39 | 27 - 37 | 29 - 35 |
| 33 | 24 - 42 | 26 - 40 | 28 - 38 | 30 - 36 |
| 34 | 25 - 43 | 27 - 41 | 29 - 39 | 31 - 37 |
| 35 | 26 - 44 | 28 - 42 | 30 - 40 | 32 - 38 |
| 36 | 26 - 46 | 29 - 43 | 31 - 41 | 33 - 39 |
| 37 | 27 - 47 | 30 - 44 | 32 - 42 | 34 - 40 |
| 38 | 28 - 48 | 31 - 45 | 33 - 43 | 35 - 41 |
| 39 | 29 - 49 | 32 - 46 | 34 - 44 | 36 - 42 |
| 40 | 30 - 50 | 33 - 47 | 35 - 45 | 37 - 43 |
| 41 | 31 - 51 | 34 - 48 | 36 - 46 | 38 - 44 |
| 42 | 32 - 52 | 35 - 49 | 37 - 47 | 39 - 45 |
| 43 | 33 - 53 | 36 - 50 | 38 - 48 | 40 - 46 |
| 44 | 34 - 54 | 37 - 51 | 39 - 49 | 41 - 47 |
| 45 | 35 - 55 | 38 - 52 | 40 - 50 | 42 - 48 |
| 46 | 36 - 56 | 39 - 53 | 41 - 51 | 43 - 49 |
| 47 | 37 - 57 | 40 - 54 | 42 - 52 | 44 - 50 |
| 48 | 38 - 58 | 41 - 55 | 43 - 53 | 45 - 51 |
| 49 | 39 - 59 | 42 - 56 | 44 - 54 | 46 - 52 |
| 50 | 40 - 60 | 43 - 57 | 45 - 55 | 47 - 53 |
| 51 | 41 - 61 | 44 - 58 | 46 - 56 | 48 - 54 |
| 52 | 42 - 62 | 45 - 59 | 47 - 57 | 49 - 55 |
| 53 | 43 - 63 | 46 - 60 | 48 - 58 | 50 - 56 |
| 54 | 44 - 64 | 47 - 61 | 49 - 59 | 51 - 57 |
| 55 | 45 - 65 | 48 - 62 | 50 - 60 | 52 - 58 |
| | | | | *continued* |

**Table 15 95% Confidence Limits**
**Percentages of Blood Cells as Determined By Differential Counts**

| Observed | n = 100 | n = 200 | n = 400 | n = 800 |
|---|---|---|---|---|
| *continued* | | | | |
| 56 | 46 - 66 | 49 - 63 | 51 - 61 | 53 - 59 |
| 57 | 47 - 67 | 50 - 64 | 52 - 62 | 54 - 60 |
| 58 | 48 - 68 | 51 - 65 | 53 - 63 | 55 - 61 |
| 59 | 49 - 69 | 52 - 66 | 54 - 64 | 56 - 62 |
| 60 | 50 - 70 | 53 - 67 | 55 - 65 | 57 - 63 |
| 61 | 51 - 71 | 54 - 68 | 56 - 66 | 58 - 64 |
| 62 | 52 - 72 | 55 - 69 | 57 - 67 | 59 - 65 |
| 63 | 53 - 73 | 56 - 70 | 58 - 68 | 60 - 66 |
| 64 | 54 - 74 | 57 - 71 | 59 - 69 | 61 - 67 |
| 65 | 56 - 74 | 58 - 72 | 60 - 70 | 62 - 68 |
| 66 | 57 - 75 | 59 - 73 | 61 - 67 | 63 - 69 |
| 67 | 58 - 76 | 60 - 74 | 62 - 72 | 64 - 70 |
| 68 | 59 - 77 | 61 - 75 | 63 - 73 | 65 - 71 |
| 69 | 60 - 78 | 63 - 75 | 64 - 74 | 66 - 72 |
| 70 | 61 - 79 | 64 - 76 | 65 - 75 | 67 - 73 |
| 71 | 62 - 80 | 65 - 77 | 67 - 75 | 68 - 74 |
| 72 | 63 - 81 | 66 - 78 | 68 - 76 | 69 - 75 |
| 73 | 64 - 82 | 67 - 79 | 69 - 77 | 70 - 76 |
| 74 | 65 - 83 | 68 - 80 | 70 - 78 | 71 - 77 |
| 75 | 66 - 84 | 69 - 81 | 71 - 79 | 72 - 78 |
| 76 | 68 - 84 | 70 - 82 | 72 - 80 | 73 - 79 |
| 77 | 69 - 85 | 71 - 83 | 73 - 81 | 74 - 80 |
| 78 | 70 - 86 | 72 - 84 | 74 - 82 | 75 - 81 |
| 79 | 71 - 87 | 73 - 85 | 75 - 83 | 76 - 82 |
| 80 | 72 - 88 | 74 - 86 | 76 - 84 | 77 - 83 |
| 81 | 73 - 89 | 76 - 86 | 77 - 85 | 78 - 84 |
| 82 | 74 - 90 | 77 - 87 | 78 - 86 | 79 - 85 |
| 83 | 76 - 90 | 78 - 88 | 79 - 87 | 80 - 86 |
| 84 | 77 - 91 | 79 - 89 | 80 - 88 | 81 - 87 |
| 85 | 78 - 92 | 80 - 90 | 81 - 89 | 83 - 87 |
| 86 | 79 - 93 | 81 - 91 | 83 - 89 | 84 - 88 |
| | | | | *continued* |

**Table 15 95% Confidence Limits**
**Percentages of Blood Cells as Determined By Differential Counts**

| Observed | n = 100 | n = 200 | n = 400 | n = 800 |
|---|---|---|---|---|
| *continued* | | | | |
| 87 | 80 - 94 | 82 - 92 | 84 - 90 | 85 - 89 |
| 88 | 82 - 94 | 83 - 93 | 85 - 91 | 86 - 90 |
| 89 | 83 - 95 | 85 - 93 | 86 - 92 | 87 - 91 |
| 90 | 84 - 96 | 86 - 94 | 87 - 93 | 88 - 92 |
| 91 | 85 - 97 | 87 - 95 | 88 - 94 | 89 - 93 |
| 92 | 87 - 97 | 88 - 96 | 89 - 95 | 90 - 94 |
| 93 | 88 - 98 | 89 - 97 | 90 - 96 | 91 - 95 |
| 94 | 89 - 99 | 91 - 97 | 92 - 96 | 92 - 96 |
| 95 | 91 - 99 | 92 - 98 | 93 - 97 | 93 - 97 |
| 96 | 92- 100 | 93 - 99 | 94 - 98 | 95 - 97 |
| 97 | 94- 100 | 95 - 99 | 95 - 99 | 96 - 98 |
| 98 | 95- 100 | 96- 100 | 97 - 99 | 97 - 99 |
| 99 | 97- 100 | 98- 100 | 98- 100 | 98- 100 |

# APPENDIX D
# UNIVERSAL TUBE PROCESSING MODULE OPTION

## OVERVIEW

The Universal Tube Processing Module permits a STKS to run additional tube sizes and styles in the Primary Mode. This appendix lists the tubes shown to be compatible with the Universal Tube Processing Module. This is not a recommendation of the use of one tube in preference to another nor a guarantee of the acceptability of the sample tube to produce quality results. If you need information on a tube not listed in this document, contact your Coulter Representative. If you need to determine whether you have the Universal Tube Processing module option, see How to Check if Universal Tube Processing Module is Present.

---

**CAUTION**

**Possible specimen leakage or clogging of the aspiration system can occur. Excessive piercing of the sample tubes causes significant coring of the stopper. The number of pierces without problems can vary slightly among sample tube types and manufacturers. Typically, do not pierce a blood collection tube listed in this document more than five times.**

---

The Universal Tube Processing Module consists of :

- **Universal Button/Stripper Plate** - Accommodates various sizes and styles of tube caps during blood sampling.
- **Self-Adjusting Tube Detector** - Automatically adjusts to various sizes of tubes in the same cassette without any need to manually change the instrument tube detector settings.
- **Tube Adaptors** - Two sizes of gray sleeve adaptors accommodate some narrow and short tubes. One adaptor is for 2.0-mL tubes and the other for 3.0-mL tubes. The gray sleeve adaptors allow you to process these tube sizes in standard 13-mm cassettes.
- **Cassette Clips** - Clips that you permanently install in each opening of the special cassettes for tubes with HEMOGARD Closure so that the special cassette can accommodate additional types of tubes.

## TUBES WITHOUT ADAPTORS OR CLIPS

### List of Tubes

With the Universal Tube Processing Module, you can process these tubes in the Primary Mode without adaptors or clips. Use the tubes listed only with the cassette indicated.

Note: **13-mm** cassettes are also known as **5-mL** cassettes. **16-mm** cassettes are also known as **7-mL** cassettes.

### BECTON DICKINSON VACUTAINER Tubes, Worldwide

| BD No. | Volume | o.d. x Length (mm) | Cassette |
|---|---|---|---|
| 6405 | 2.5 mL | 13.0 x 75 | 13 mm |
| 6454 | 7.0 mL | 16.0 x 75 | 16 mm |
| 6456 | 5.0 mL | 13.0 x 75 | 13 mm |
| 6458 | 3.5 mL | 16.0 x 75 | 16 mm |
| 6452 (Europe) | 4.5 mL | 13.0 x 75 | 13 mm |
| 6452 (USA) | 5.0 mL | 13.0 x 75 | 13 mm |
| 6536 | 5.0 mL | 13.0 x 75 | 13 mm |
| 6537 | 7.0 mL | 16.0 x 75 | 16 mm |
| 6545 | 4.0 mL | 16.0 x 75 | 16 mm |
| 6564 | 2.5 mL | 13.0 x 75 | 13 mm |

### BECTON DICKINSON Glass Tubes with HEMOGARD Closure

| BD No. | Volume | o.d. x Length (mm) | *Cassette |
|---|---|---|---|
| 367650 | 3.0 mL | 13.0 x 75 | *Special for tubes |
| 367651 | 2.0 mL | 13.0 x 75 | with HEMOGARD |
| 367653 | 5.0 mL | 13.0 x 75 | Closure |
| 367658 | 5.0 mL | 13.0 x 75 | |
| 367661 | 3.0 mL | 13.0 x 75 | |
| 367662 | 5.0 mL | 13.0 x 75 | |

* Can be used with or without the Cassette Clips installed in this cassette.

### BECTON DICKINSON Plastic Tubes with HEMOGARD Closure

| BD No. | Volume | o.d. x Length (mm) | *Cassette |
|---|---|---|---|
| 367841 | 2.0 mL | 13.0 x 75 | *Special for tubes |
| 367842 | 2.0 mL | 13.0 x 75 | with HEMOGARD |
| 367856 | 3.0 mL | 13.0 x 75 | Closure |
| 367859 | 3.0 mL | 13.0 x 75 | |
| 367861 | 4.0 mL | 13.0 x 75 | |
| 367862 | 4.0 mL | 13.0 x 75 | |

* Can be used with or without the Cassette Clips installed in this cassette.

## COULTER

| Type | o.d. x Length (mm) | Cassette |
|---|---|---|
| 5C cell control tubes | 13.0 x 62 | 13 mm |
| S-CAL calibrator tubes | 13.0 x 62 | 13 mm |

## LABO EXPRESS SERVICE (LES)

| LABO Type | Volume | o.d. x Length (mm) | Cassette |
|---|---|---|---|
| Plastic purple | 4.0 mL | 13.0 x 75 | 13 mm |

## LDM

| LDM No. | Volume | o.d. x Length (mm) | *Cassette |
|---|---|---|---|
| 940712 | 5.0 mL | 12.0 x 75 | *Special for tubes with |
| 940713 | 5.0 mL | 12.0 x 75 | HEMOGARD Closure |

* Can be used with or without the Cassette Clips installed in this cassette.

## SHERWOOD MEDICAL

| SHERWOOD No. | Volume | o.d. x Length (mm) | Cassette |
|---|---|---|---|
| 8881-314440 | 3.0 mL | 13.0 x 75 | 13 mm |
| 8881-311446 | 5.0 mL | 13.0 x 75 | 13 mm |
| 8881-311644 | 7.0 mL | 16.0 x 75 | 16 mm |

## TERUMO VENOJECT Tubes

| TERUMO No. | Volume | o.d. x Length (mm) | Cassette |
|---|---|---|---|
| T-206SQS | 5.0 mL | 13.0 x 75 | 13 mm |
| T-202SQS | 7.0 mL | 16.0 x 75 | 16 mm |
| T-325SQS | 2.5 mL | 13.0 x 75 | 13 mm |

### TERUMO VENOJECT II Foil Top

| TERUMO No. | Volume | o.d. x Length (mm) | Cassette |
|---|---|---|---|
| *P-206SQK | 5.0 mL | 13.0 x 75 | 13 mm |
| *P-225SQK | 2.5 mL | 13.0 x 75 | 13 mm |

* These tubes require minimum of 1.8 mL of sample. Do not pierce these tubes more than two times.

## Labeling Requirements

- You can use a maximum of two labels in addition to the sample tube manufacturer's label.
- Do not skew the bar-code label more than 12 degrees.
- Ensure that the bar-code symbol and a 1/4-inch blank space "quiet zone" on either side of the bar-code symbol are visible to the scanner.
- - For tubes with rubber-stopper caps or foil tops: Place the bar-code label so that the first bar of the bar-code symbol is at least **1/2 inch** from the tube cap.
  - For all other tubes: Place the bar-code label so that the first bar of the bar-code symbol is at least **1/4 inch** from the tube cap.

# TUBES WITH SLEEVE ADAPTORS

---

**CAUTION**

**If your STKS does NOT have a Universal Tube Processing Module option present, do not use tube adaptors. Use of tube adaptors without the option can cause excessive partial aspirations and difficulty reading bar-code labels.**

---

## Description

Two sizes (2 mL and 3 mL) of gray sleeve adaptors are available to accommodate some narrow and short tubes. Place the tube inside the adaptor before placing it into a 13-mm cassette.

**CAUTION**

**The clear adaptors for the COULTER MAXM, JT2 and JT3 analyzers cannot be used on the STKS. These adaptors could cause jamming of the tubes. Only use the gray sleeve adaptors with tubes processed in the Universal Tube Processing Module on the STKS.**

| Sleeve Adaptor | Solid Base Length | Color |
|---|---|---|
| 2 mL | 1 inch | Dark gray |
| 3 mL | 1/2 inch | Light gray |

## List of Tubes

You must use the following tubes with the gray sleeve adaptors.

### BECTON DICKINSON VACUTAINER Tubes, Worldwide

| BD No. | Volume | o.d. x Length (mm) | Adaptor | Cassette |
|---|---|---|---|---|
| 6384 | 2.0 mL | 10.25 x 47 | 2 mL | 13 mm |
| 6385 | 3.0 mL | 10.25 x 64 | 3 mL | 13 mm |

### SHERWOOD MEDICAL

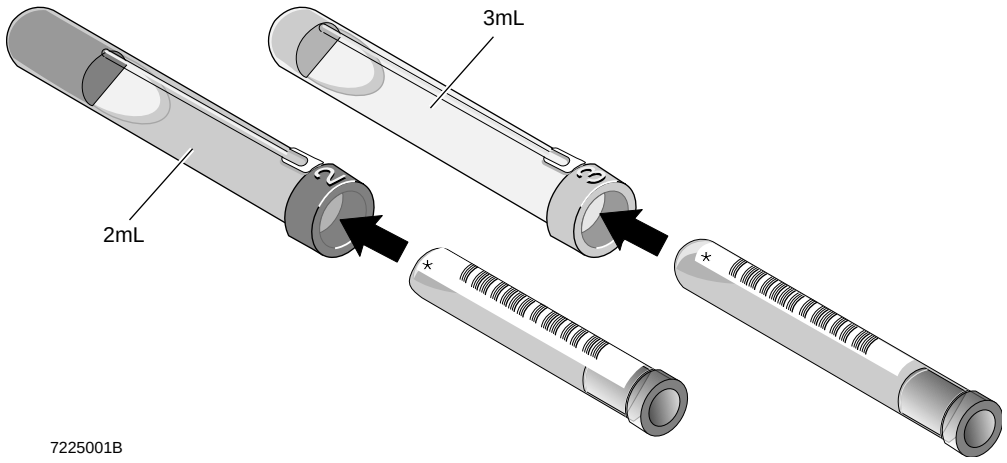
| SHERWOOD No. | Volume | o.d. x Length (mm) | Adaptor | Cassette |
|---|---|---|---|---|
| 8881-311149 | 2.0 mL | 10.25 x 50 | 2 mL | 13 mm |
| 8881-311248 | 3.0 mL | 10.25 x 64 | 3 mL | 13 mm |

### TERUMO

| TERUMO No. | Volume | o.d. x Length (mm) | Adaptor | Cassette |
|---|---|---|---|---|
| T-272SQS | 2.0 mL | 10.25 x 50 | 2 mL | 13 mm |
| T-273SQS | 3.0 mL | 10.25 x 65 | 3 mL | 13 mm |

## Labeling Requirements

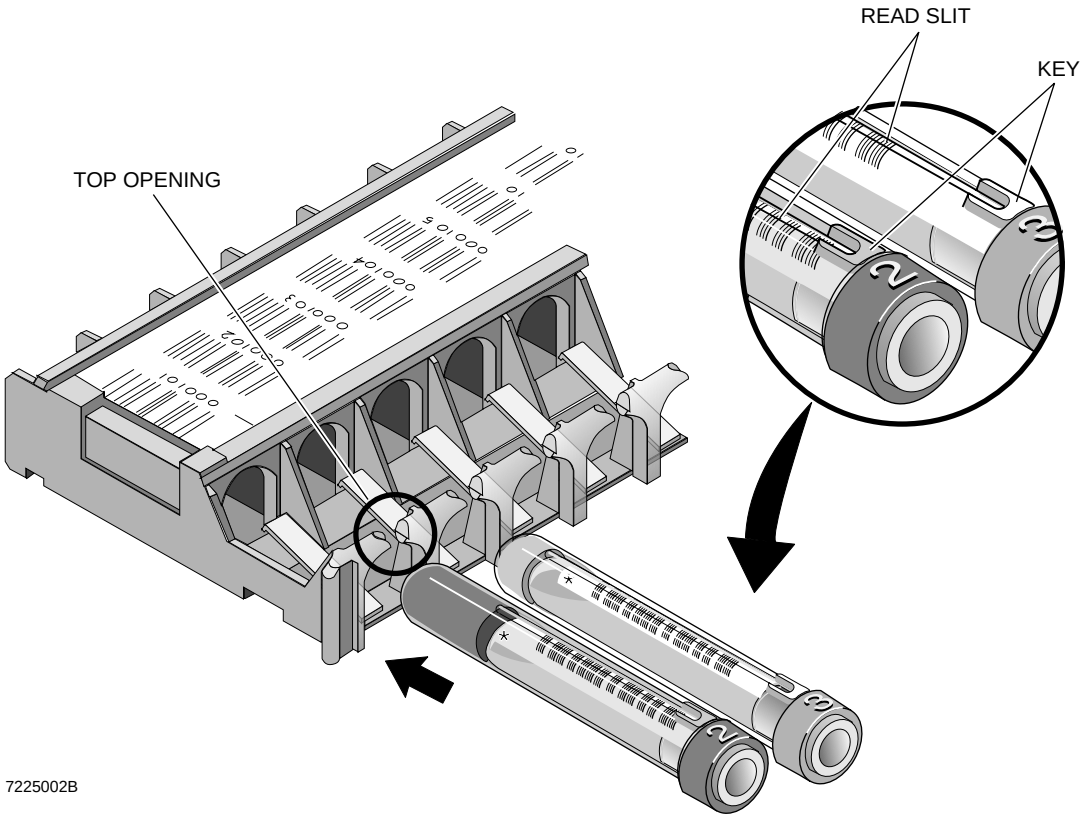
- You can use a maximum of two labels in addition to the sample tube manufacturer's label.
- Place each label so that it does not cover the bottom of the tube and is flat and smooth against the tube. This prevents the adaptor from being broken or jammed.
- Do not skew the bar-code label more than 5 degrees.
- Ensure that the bar-code symbol and a 1/4-inch blank space "quiet zone" on either side of the bar-code symbol are visible through the read slit when you insert the tube into the adaptor.
- Place tubes with bar-code labels into the two types of sleeve adaptors (2 mL and 3 mL) so the bar-code scanner can read the labels through the read slits. The illustration shows correct tube and bar-code label placement.




- The length of the tube and the read slit length of the sleeve adaptor might reduce the number of data digits that can be read from your bar-code labels. The scanner can only read the portion of the bar-code label within the read slit.

### Placement in Cassette

Figure shows the two types of gray sleeve adaptors used in a 13-mm cassette. You must position the gray sleeve adaptors in a cassette so that their keys (located on top of their bar-code read slits) fit into the top openings of the cassette.




## TUBES WITH CASSETTE CLIPS

Permanently place the Cassette Clips into all 12 openings of each special cassette for tubes with HEMOGARD Closure to process additional sizes of tubes.

### List of Tubes

You **MUST** use these tubes with the Cassette Clips installed in the special cassette for tubes with HEMOGARD Closure:

### KABE

| KABE No. | Volume | o.d. x Length (mm) | Cassette (with Cassette Clips Installed) |
|---|---|---|---|
| E201N | 1.8 mL | 11.5 x 50 | Special for tubes with HEMOGARD Closure |
| E301N | 3.0 mL | 11.5 x 66 | |

### SARSTEDT

| SARSTEDT No. | Volume | o.d. x Length (mm) | Cassette (with Cassette Clips Installed) |
|---|---|---|---|
| 05.1167.600 | 2.7 mL | 11.5 x 66 | Special for tubes with HEMOGARD Closure |

For optimal performance, Coulter recommends that you use these tubes with the Cassette Clips installed in the special cassette for tubes with HEMOGARD Closure:

### GREINER Vacuette Tubes

| GREINER No. | Volume | o.d. x Length (mm) | Cassette (with Cassette Clips Installed) |
|---|---|---|---|
| 454087 | 2.0 mL | 13.0 x 75 | Special for tubes with HEMOGARD Closure |
| 454086 | 3.0 mL | 13.0 x 75 | |
| 454036 | 4.0 mL | 13.0 x 75 | |

### LABCO Exetainer Tubes

| LABCO No. | Volume | o.d. x Length (mm) | Cassette (with Cassette Clips Installed) |
|---|---|---|---|
| 35241S140 | 3.0 mL | 12.0 x 81 | Special for tubes with HEMOGARD Closure |
| 35271S159 | 5.0 mL | 12.0 x 81 | |

**LIP**

| LIP No. | Volume | o.d. x Length (mm) | Cassette (with Cassette Clips Installed) |
|---|---|---|---|
| 38887 2KE2.5/GL | 2.5 mL | 12.0 x 81 | Special for tubes with |
| 38908 2KE4/GL | 4.0 mL | 12.0 x 81 | HEMOGARD Closure |
| 38917 3KE4/GL | 4.0 mL | 12.0 x 81 | |

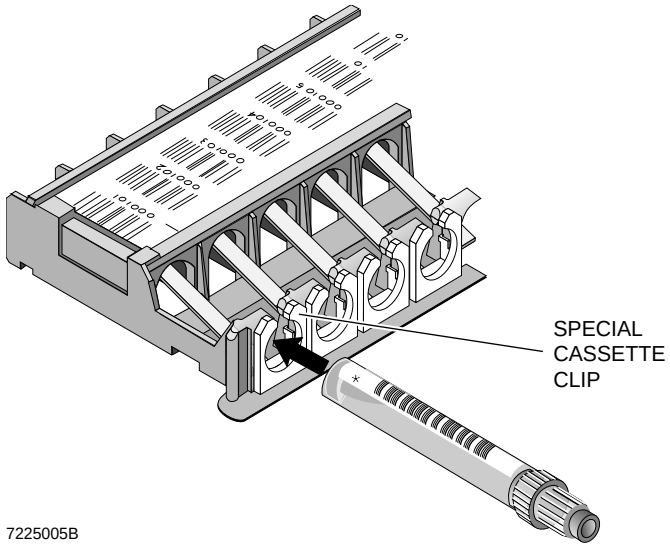
## Labeling Requirements

- You can use a maximum of two labels in addition to the sample tube manufacturer's label.
- Do not skew the bar-code label more than 12 degrees.
- Ensure that the bar-code symbol and a 1/4-inch blank space "quiet zone" on either side of the symbol are visible to the scanner.
- Place labels flush with the tube cap.

## Placement in Cassette

Figure shows the Cassette Clips already installed in a special cassette for tubes with HEMOGARD Closure.

Make sure the bar-code label faces up when you place a tube into the cassette so that it may be scanned correctly.

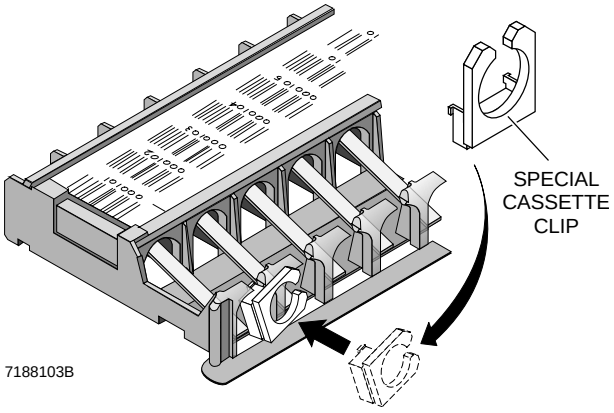


## Installing the Cassette Clips

Install the Cassette Clips into the special cassettes for tubes with HEMOGARD Closure. There is no need to remove them because you can use any of the tubes approved for this cassette with these Cassette Clips in place.

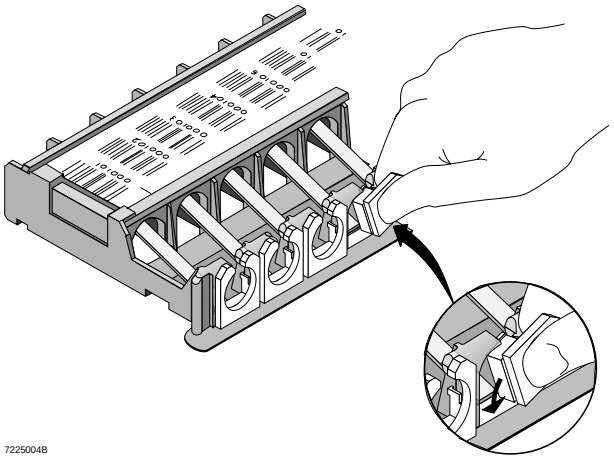
To install Cassette Clips into the special cassette for tubes with HEMOGARD Closure:

1. Place the bottom of the Cassette Clip into the opening of the cassette.




2. Pressing down on the Cassette Clip, turn it to the left (counterclockwise) until it clicks into place. Then push down on the Cassette Clip to position it at the bottom of the cassette opening.

   Note: It is easiest to insert the first Cassette Clip into the far left opening of the cassette (cassette position one). Then proceed in order from left to right.




3. Install Cassette Clips into all 12 tube openings of each special cassette for tubes with HEMOGARD Closure.

## HOW TO CHECK IF UNIVERSAL TUBE PROCESSING MODULE IS PRESENT

To check if your instrument currently has a Universal Tube Processing Module installed:

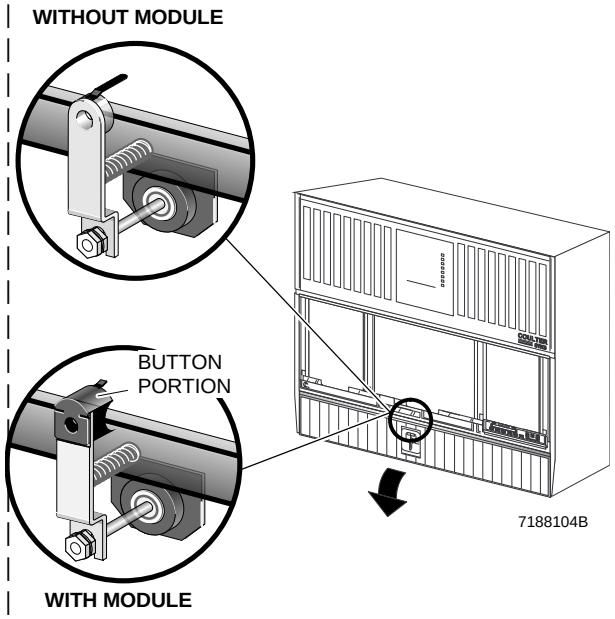
1. Wait until all cycling is completed on the instrument. Observe all safety precautions for blood and sharp objects.

2. Open the lower door of the Diluter.

3. Check if the button portion of the stripper plate is made of black plastic. When examining your system, only evaluate the button portion of the stripper plate; this is the most distinctive component of the Module. If it is black plastic, then the Universal Tube Processing Module is present.

   Note: If the button portion of the stripper plate is stainless steel, then you do not have the Universal Tube Processing Module on your system. Variations of this stripper plate exist with different lengths of the tab extending from the button, and the presence or the absence of black shielding over the stripper plate. Only use the button portion to check for the Universal Tube Processing Module.

4. Close the lower front door of the Diluter to resume operation.



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4. NCCLS document H3-A3. Procedures for the collection of diagnostic blood specimens by venipuncture. National Committee for Clinical Laboratory Standards. Villanova, PA, 1991.

5. NCCLS document H4-A3. Procedures for the collection of diagnostic blood specimens by skin puncture. National Committee for Clinical Laboratory Standards. Villanova, PA, 1991.

## Symbols


....., 79, 80, 82
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